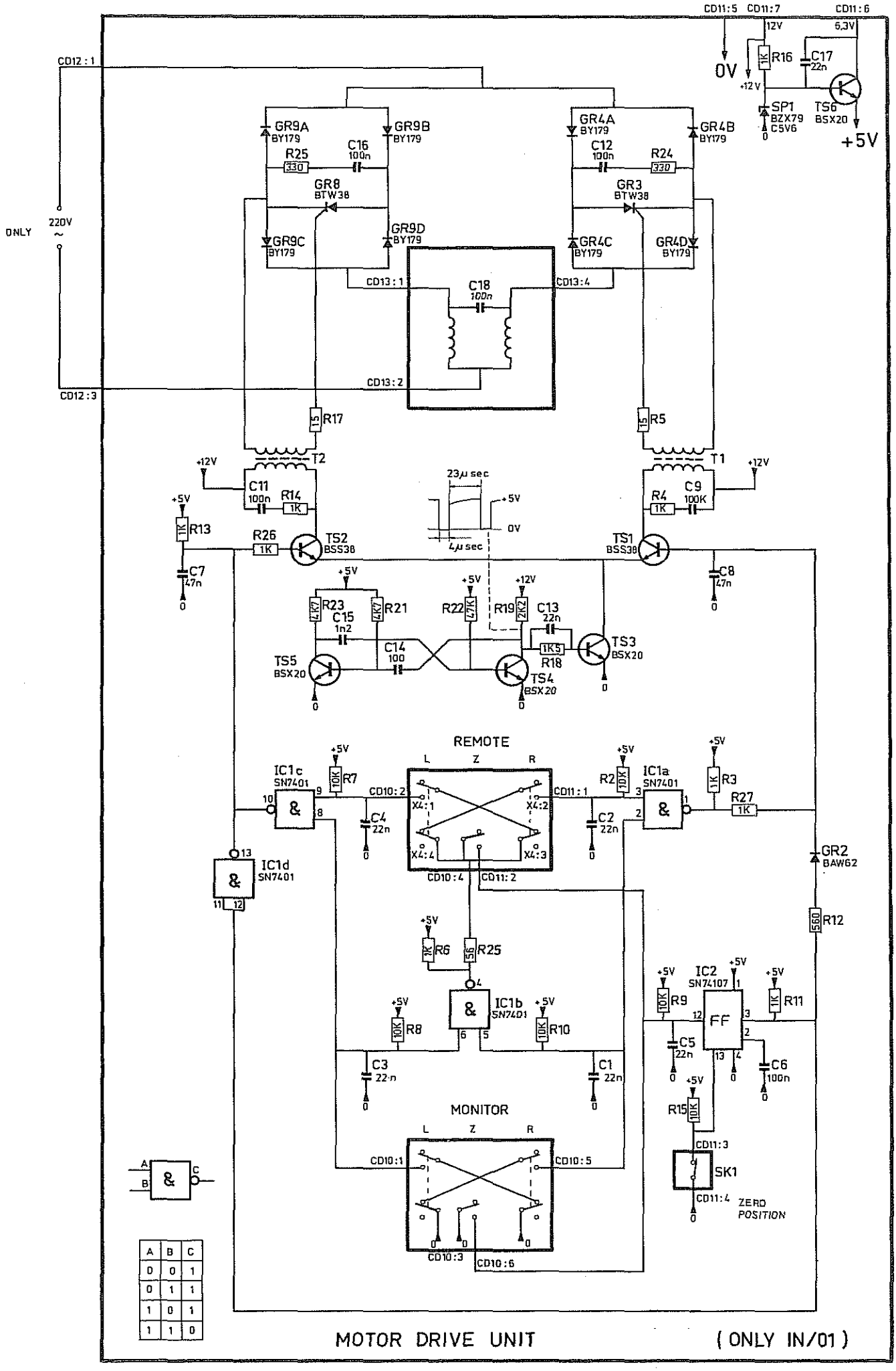
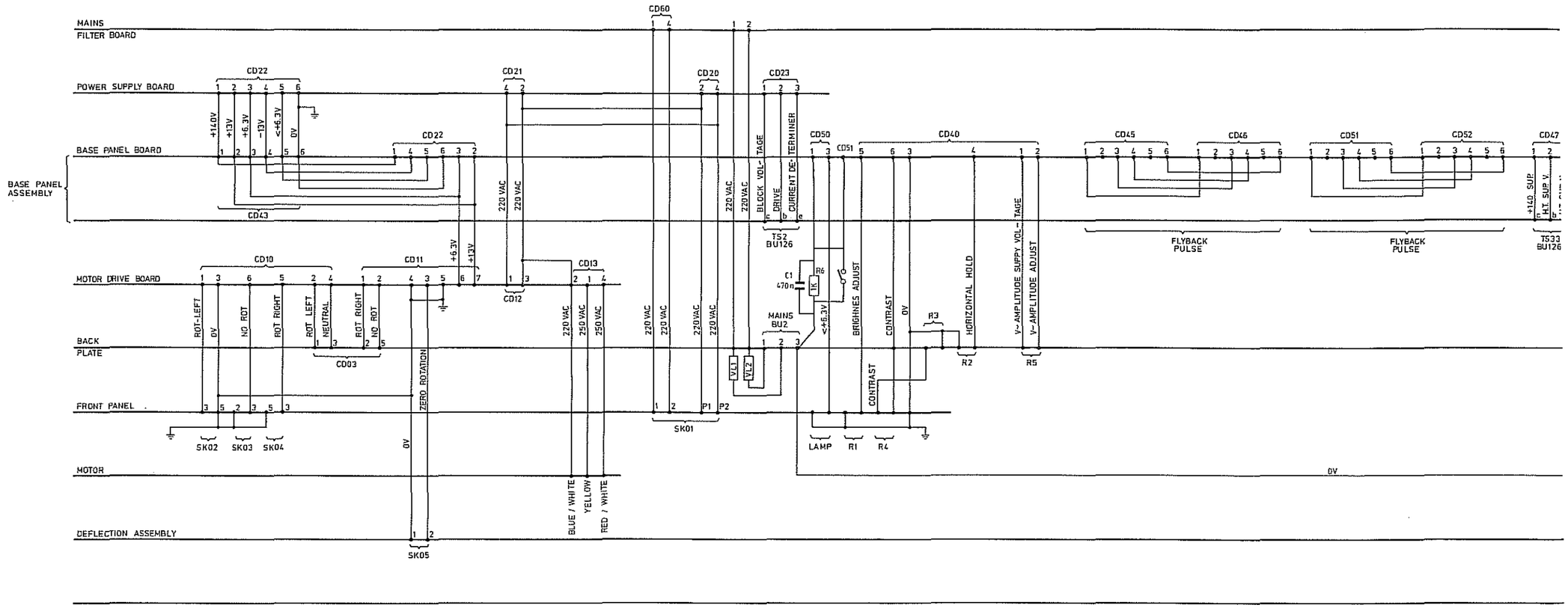
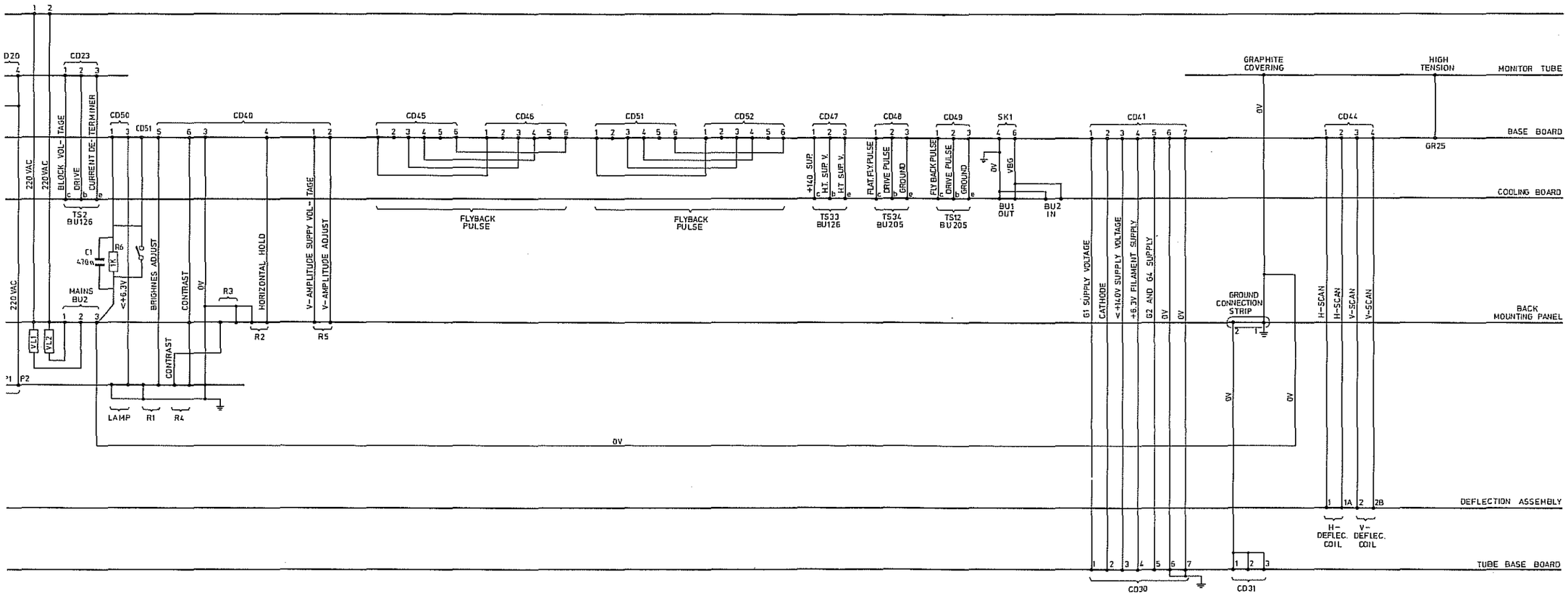


A	B	C
0	0	1
0	1	1
1	0	1
1	1	0

20" MONITOR


MAINS
FILTER BOARD
POWER SUPPLY BOARD
BASE PANEL BOARD
BASE PANEL ASSEMBLY
MOTOR DRIVE BOARD
BACK PLATE
FRONT PANEL
MOTOR
DEFLECTION ASSEMBLY
CD60
CD22
CD21
CD20
CD23
CD50
CD51
CD40
CD45
CD46
CD52
CD47
CD43
CD10
CD11
CD12
CD13
CD003
SK01
SK02
SK03
SK04
SK05
+14.0V
+13V
+6.3V
-13V
<+6.3V
0V
220 VAC
250 VAC
BLOCK VOLTAGE
DRIVE
CURRENT DET
TERMINER
TS2 BU126
TS33 BU126
FLYBACK PULSE
+14.0 SUP
H.T SUP V
V-AMPLITUDE SUPPY VOLTAGE
V-AMPLITUDE ADJUST
HORIZONTAL HOLD
CONTRAST
BRIGHNES ADJUST
MAINS BU2
C1 470n
R6 1K
R3
R2
R5
R1
R4
LAMP
VR1
VR2
ROT-LEFT
NO ROT
ROT RIGHT
ROT LEFT
NEUTRAL
ROT RIGHT
NO ROT
ZERO ROTATION
BLUE / WHITE
YELLOW
RED / WHITE



WIRING DIAGRAM

MAINS BU2
FILTER BOARD
POWER BOARD
BASE BOARD
BASE BOARD
VALVE BASE BOARD
AQUADAG
DRIVER BOARD
MOTOR
REMOTE CONTROL MOTOR BU1

VL5 VL6 CD60 P1 P2 SK01 CD20 CD21 CD42 CD22 CD43 TS2 BU126 CD23 CD45 CD46 TS33 BU126 CD47 TS34 BU205 CD48 TS12 BU205 CD49 LA1 BRIGHTNESS 1k R1 H. HOLD 10k R2 CONTRAST 2k2 R3 470 R4 V.AMPL. 47k R5 CD50 CD40 CD44 CD41 1A 1 2A 2 LINE SCAN COILS FRAME SCAN COILS CD30 CD 31

CD12 CD11 CD10 CD13 SK05 Bl. Gl. Rd.

SK02 SK03 SK04

NOT APPLICATED FOR 9807 750 20001

BU126 BU205

BU2

BU1

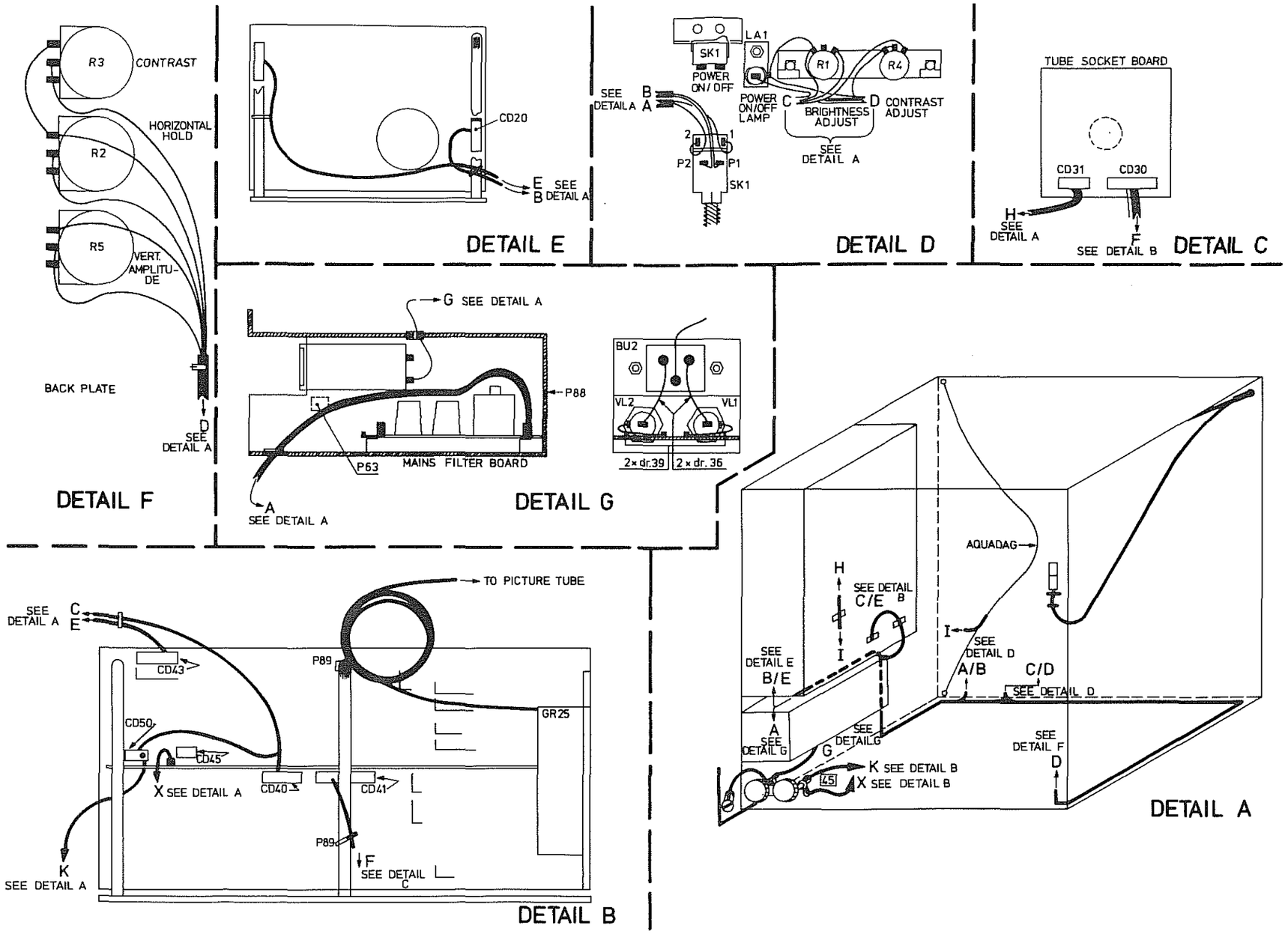
SK01

SK02 t/m 04

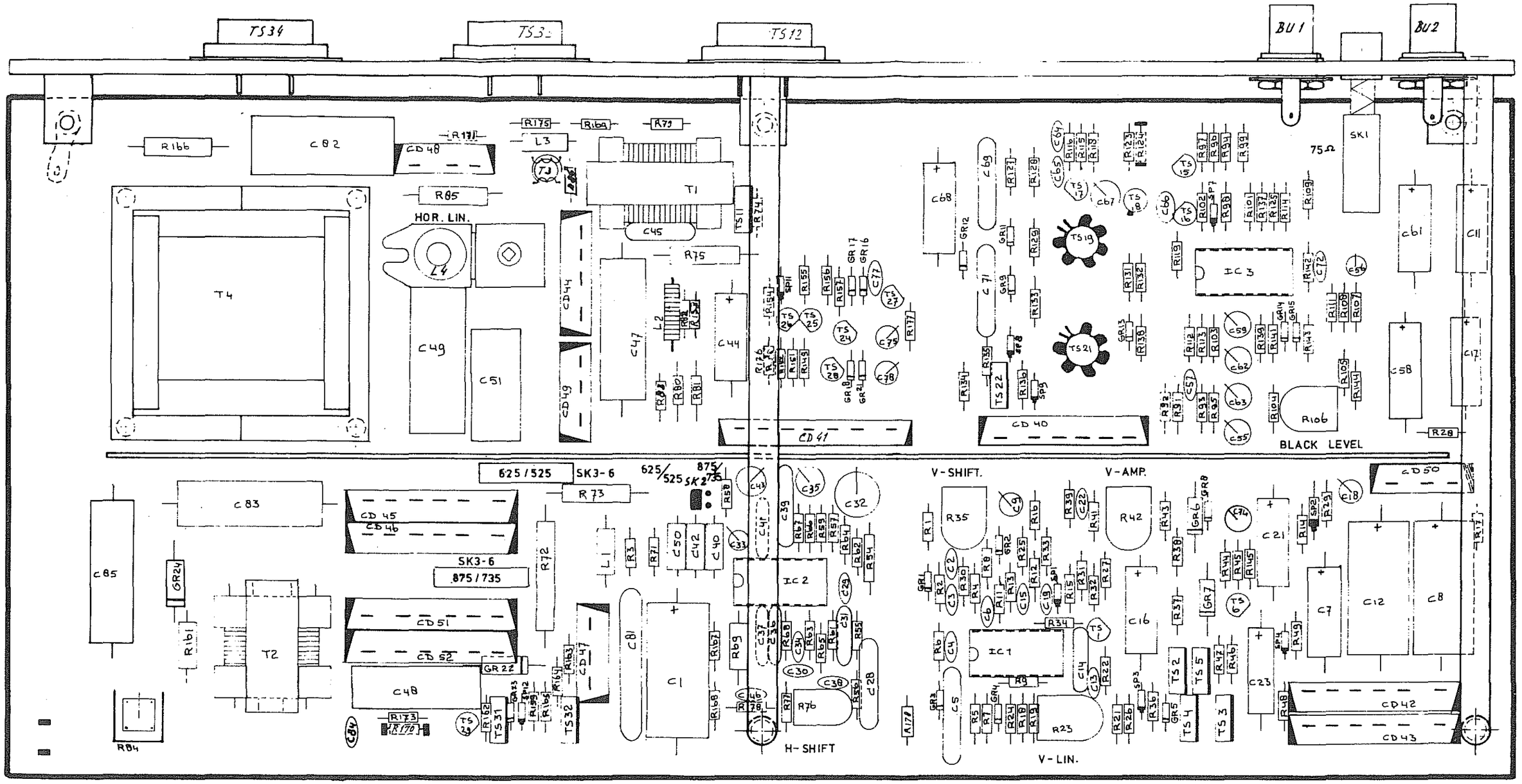
DEFLECTION COIL

SK05

9807 750 2..01 — Z2.1.1 —77.1

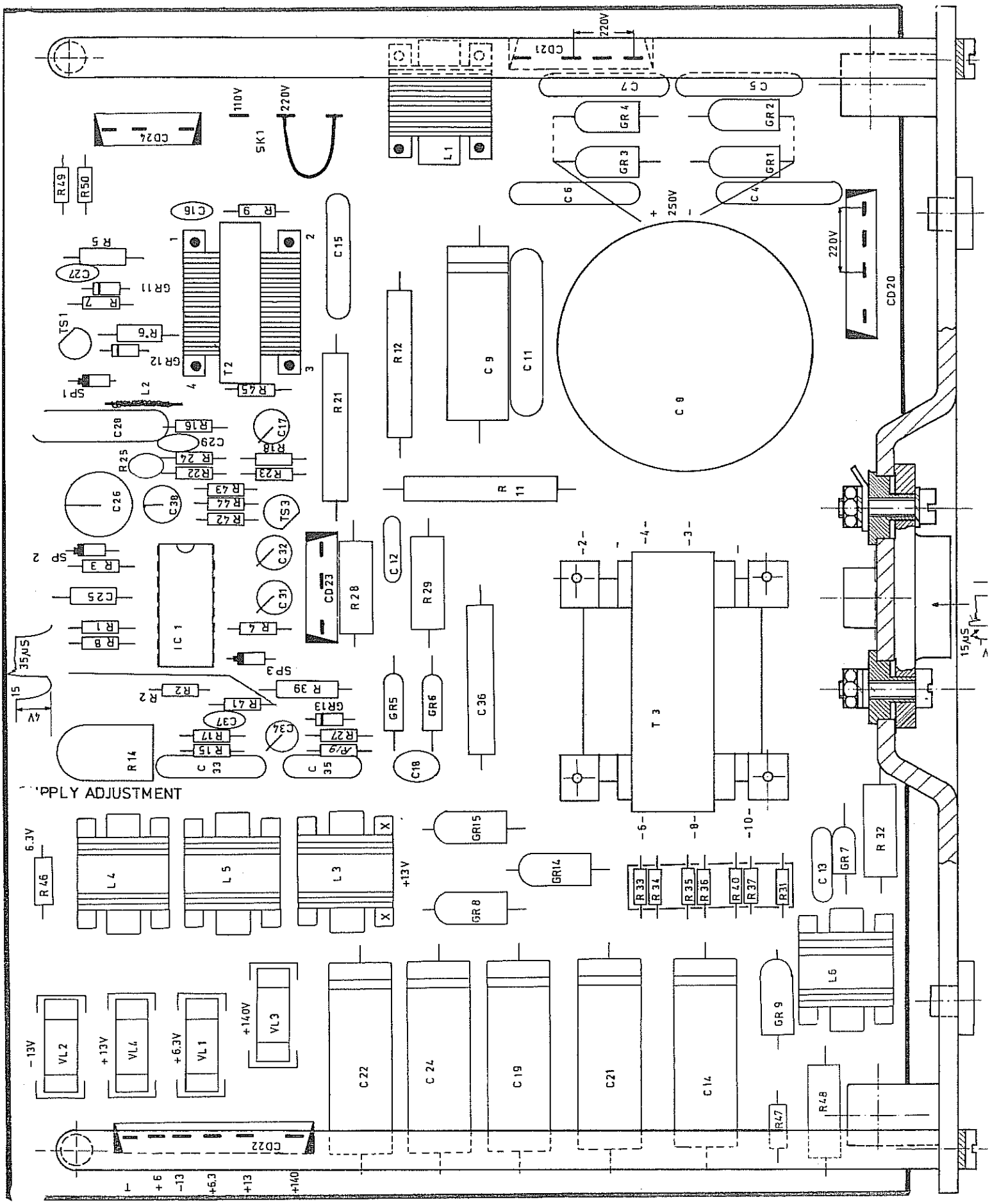

R3
CONTRAST
HORIZONTAL HOLD
R2
R5
VERT. AMPLITUDE
BACK PLATE
D
SEE DETAIL A
DETAIL F
CD20
E
B
SEE DETAIL A
DETAIL E
SEE DETAIL A
B
A
SK1
POWER ON/OFF
LA1
R1
R4
POWER ON/OFF LAMP
C
D
CONTRAST ADJUST
BRIGHTNESS ADJUST
SEE DETAIL A
2
1
P2
P1
SK1
DETAIL D
TUBE SOCKET BOARD
CD31
CD30
H
SEE DETAIL A
F
SEE DETAIL B
DETAIL C
G SEE DETAIL A
P88
P63
MAINS FILTER BOARD
A
SEE DETAIL A
DETAIL G
BU2
VL2
VL1
2 × dr.39
2 × dr. 36
TO PICTURE TUBE
SEE DETAIL A
C
E
CD43
P89
GR25
CD50
CD45
X SEE DETAIL A
CD40
CD41
P89
K
SEE DETAIL A
F
SEE DETAIL C
DETAIL B
AQUADAG
H
SEE DETAIL C/E B
I
SEE DETAIL E B/E
A
SEE DETAIL G
G
SEE DETAIL G
I
SEE DETAIL D
A/B
C/D
SEE DETAIL D
SEE DETAIL F
D
K SEE DETAIL B
X SEE DETAIL B
45
DETAIL A

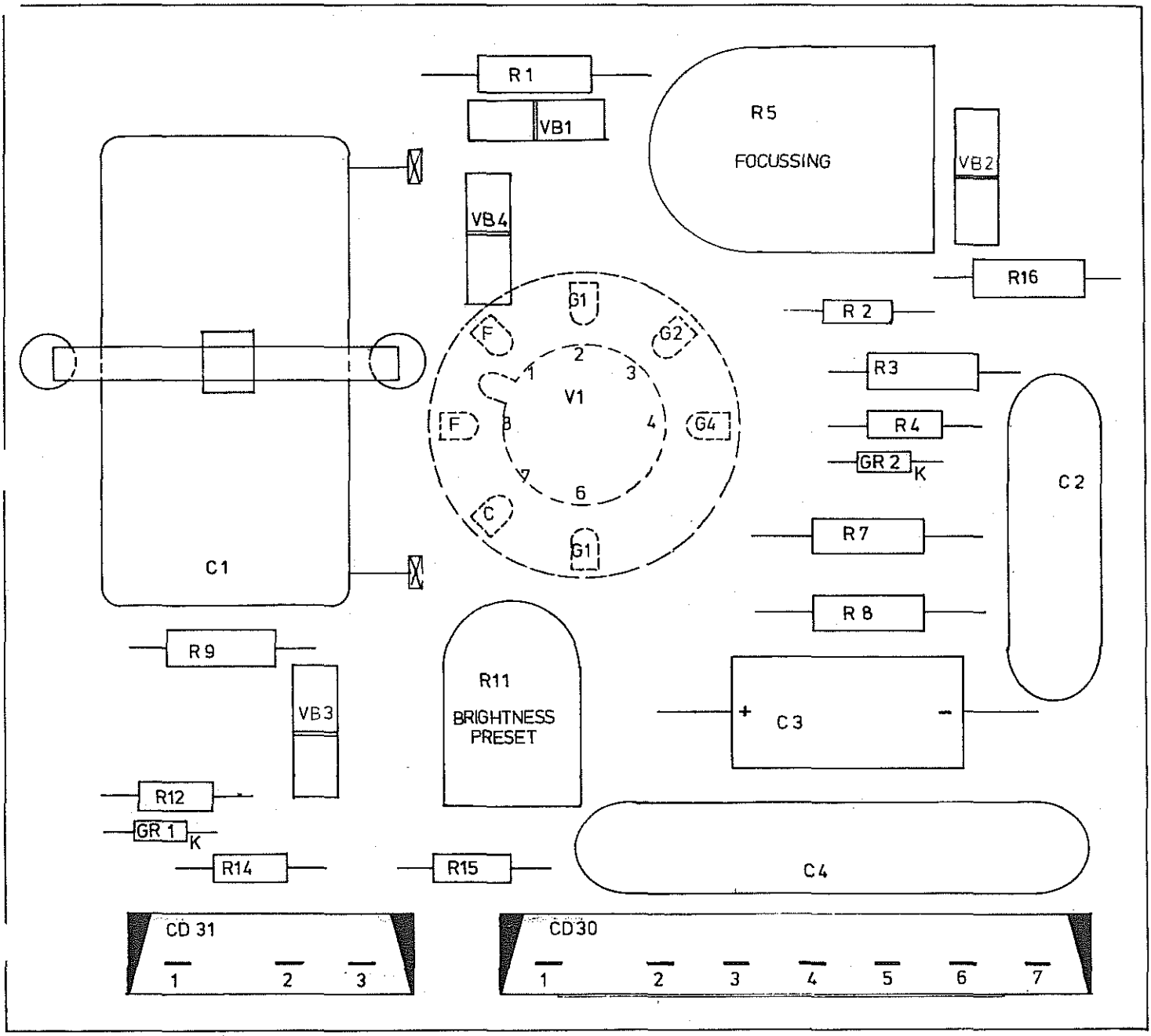
BASIC MODEL



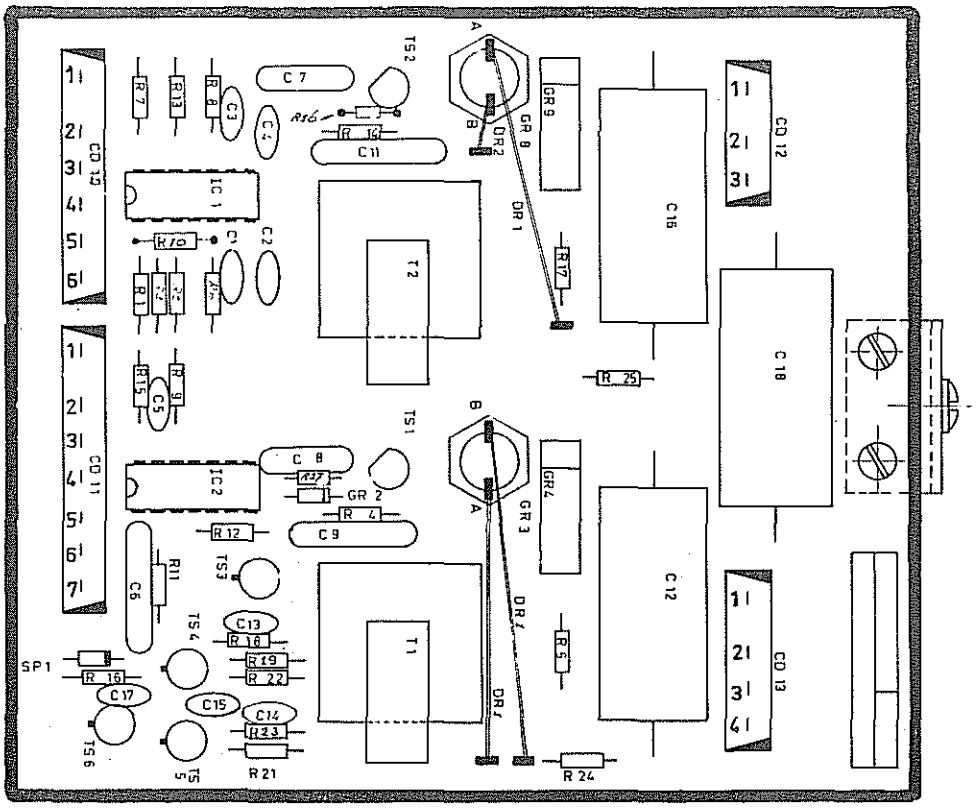
VIDEO -AMPLIFIER

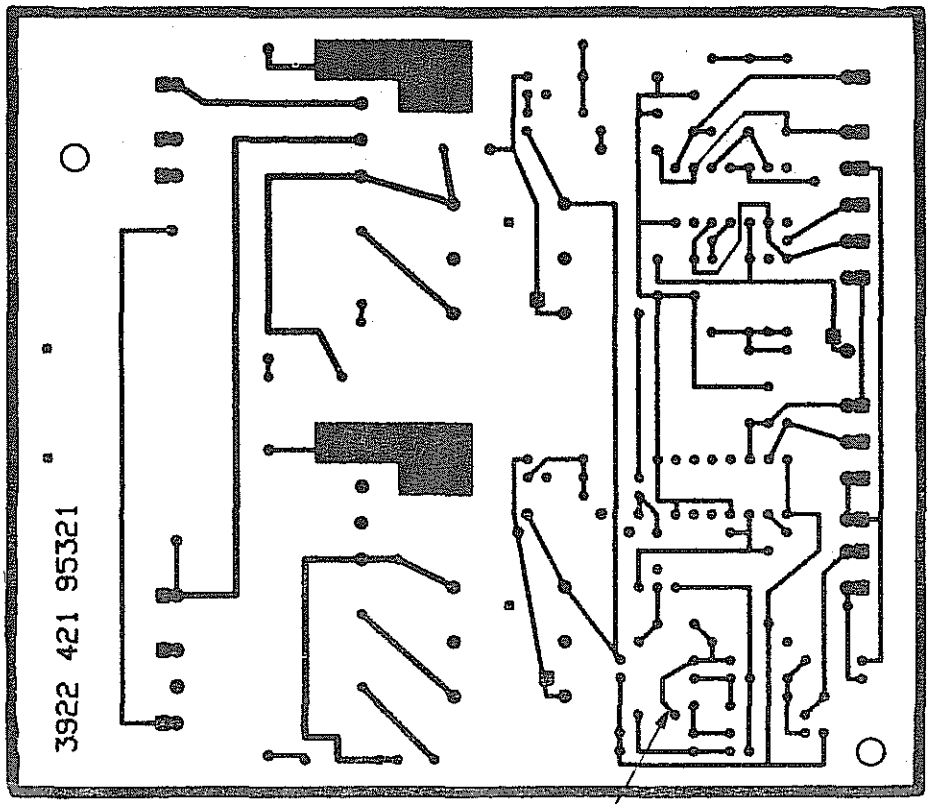
9807 750 2..01 - Z2.2.1 - 77.1


SUPPLY ADJUSTMENT
SUPPLY UNIT

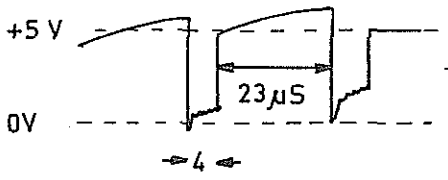


TUBE BASE BOARD

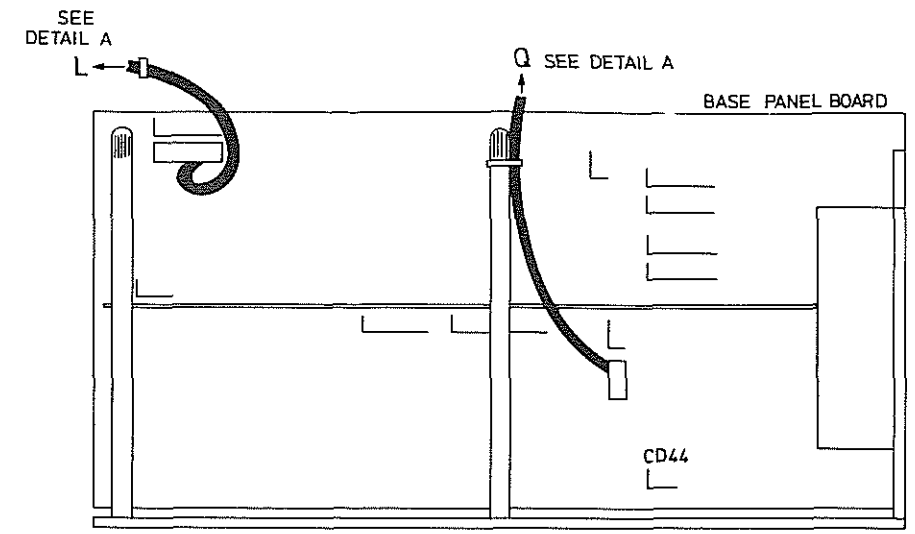




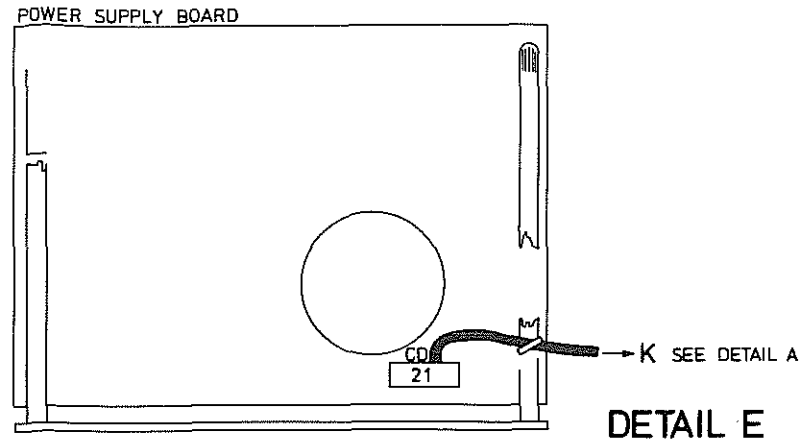
MOTOR SUPPLY UNIT
ONLY IN / 01



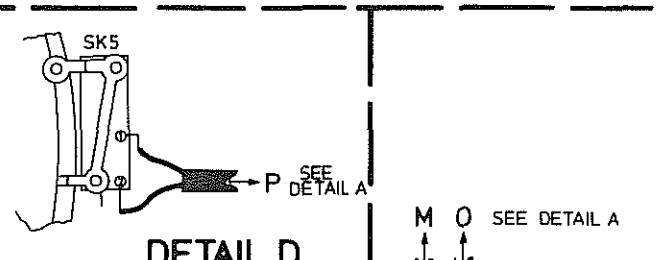
20 " MONITOR



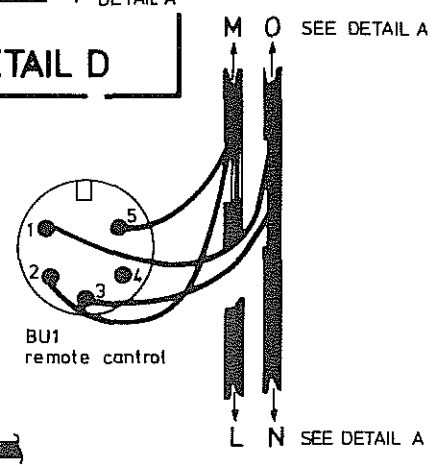
DETAIL F



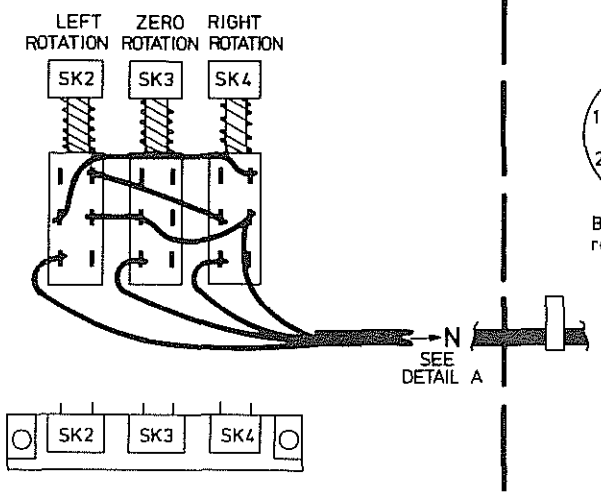
DETAIL E



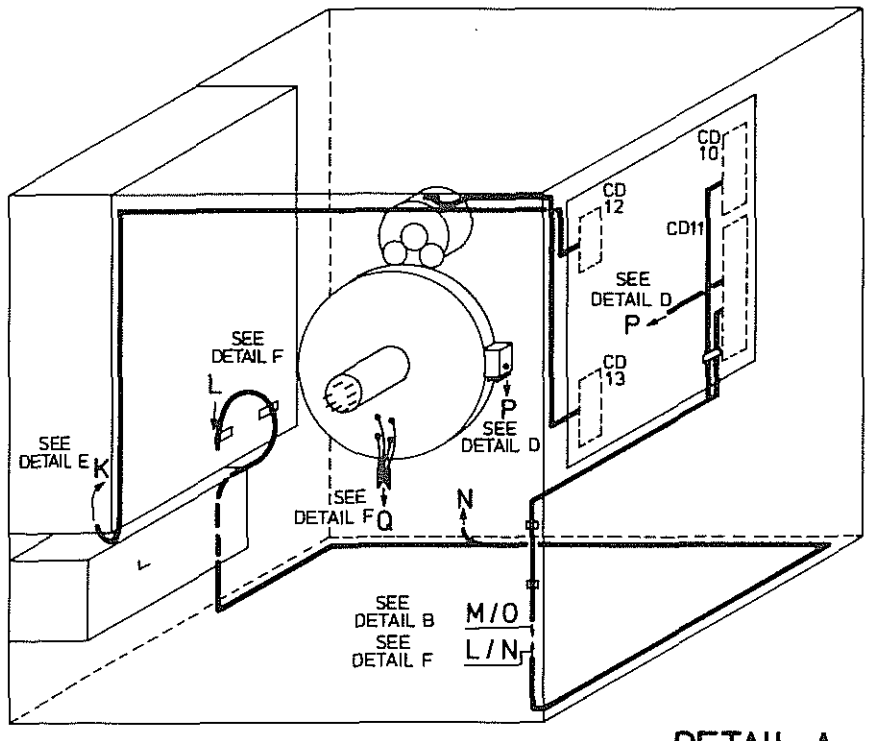
DETAIL D



DETAIL B

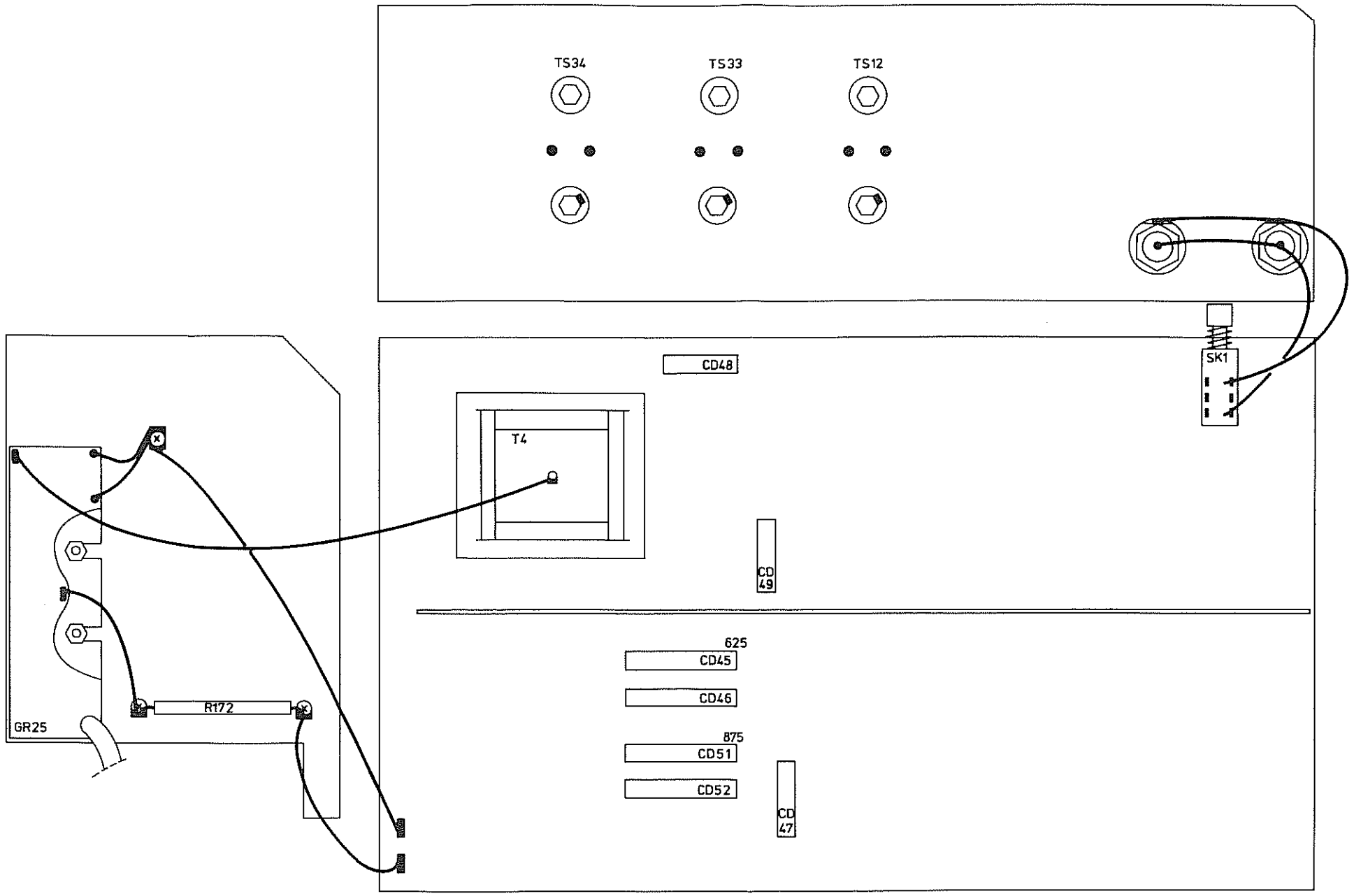


DETAIL C

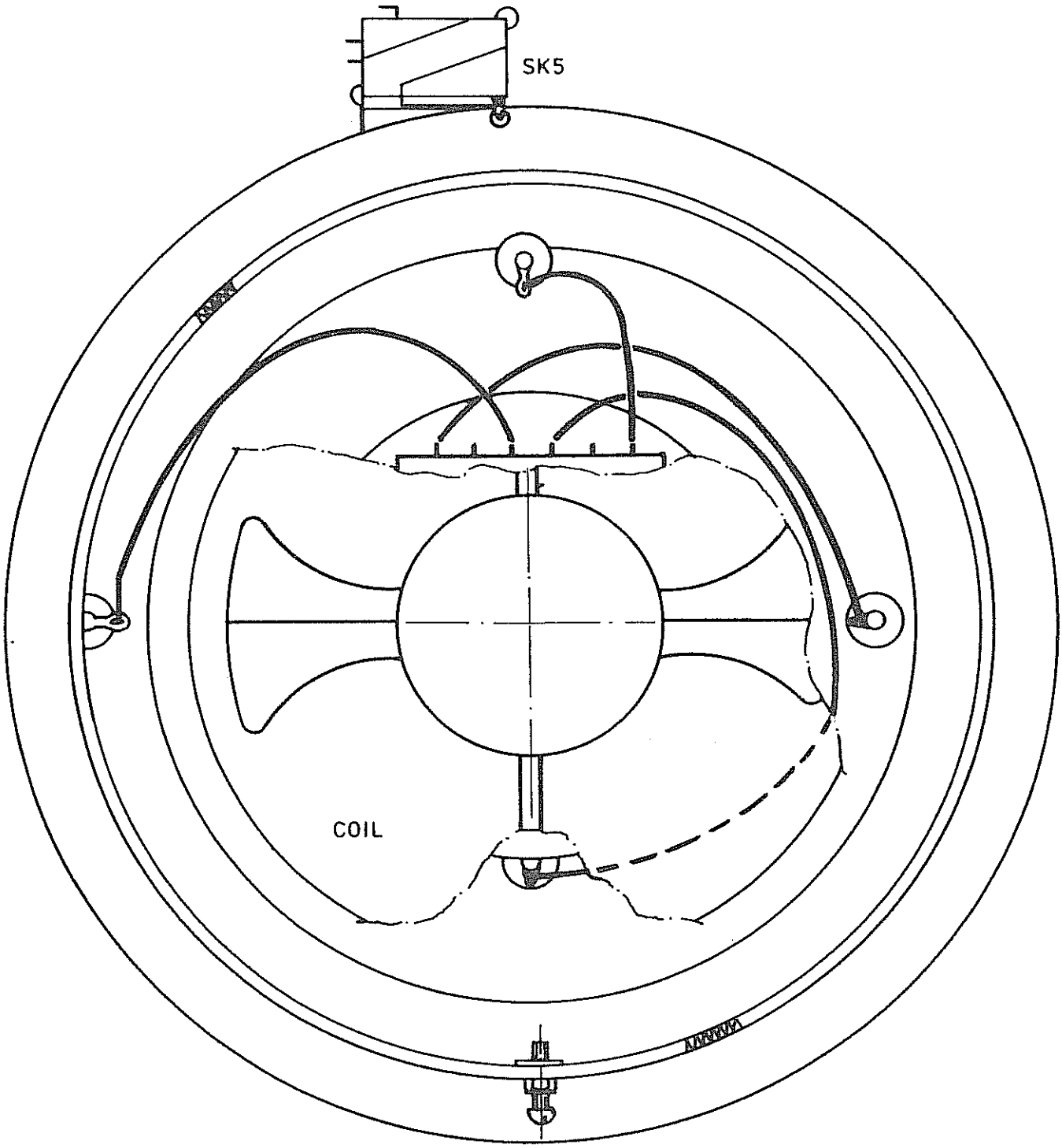


DETAIL A

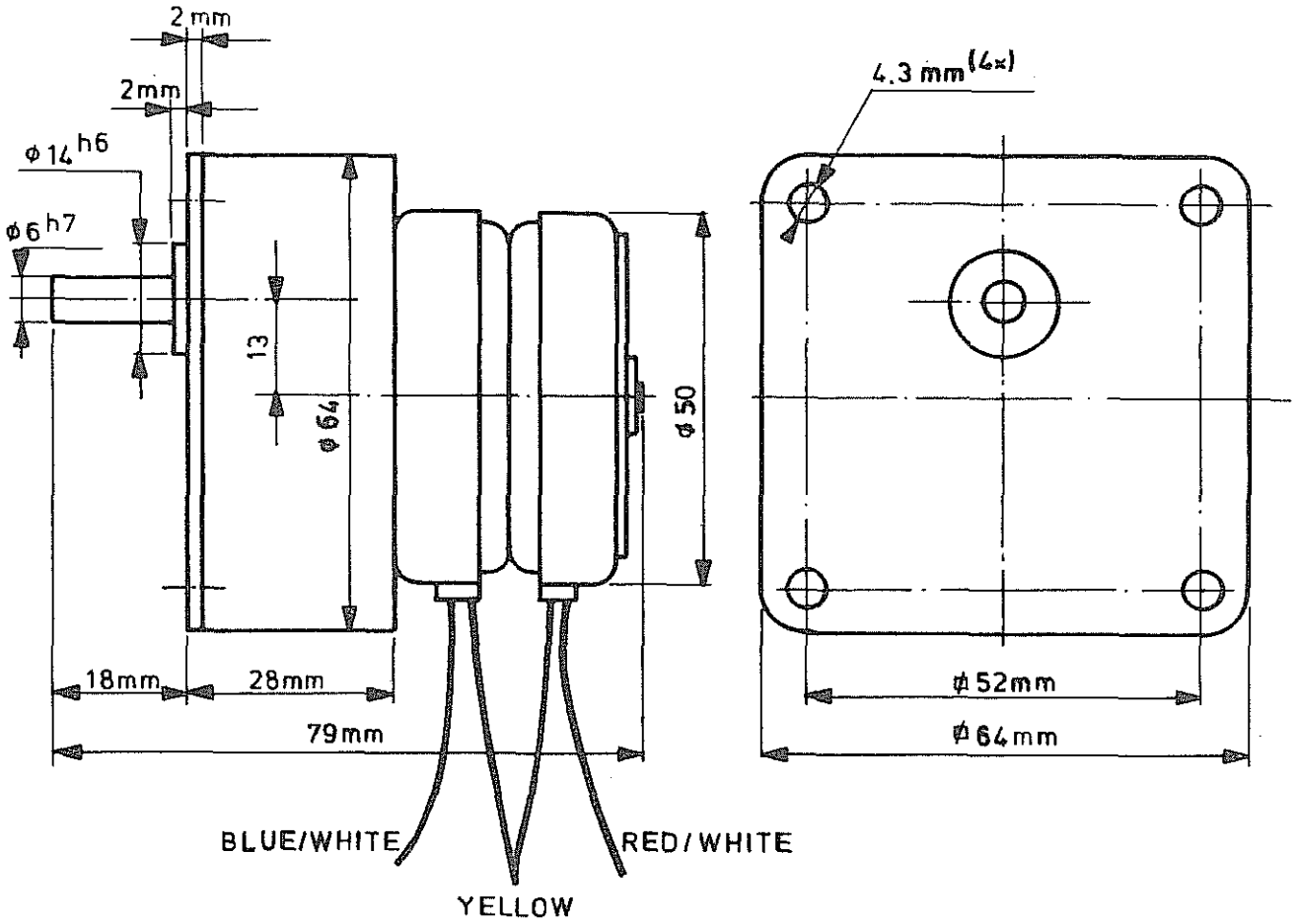
ROTATABLE IMAGE



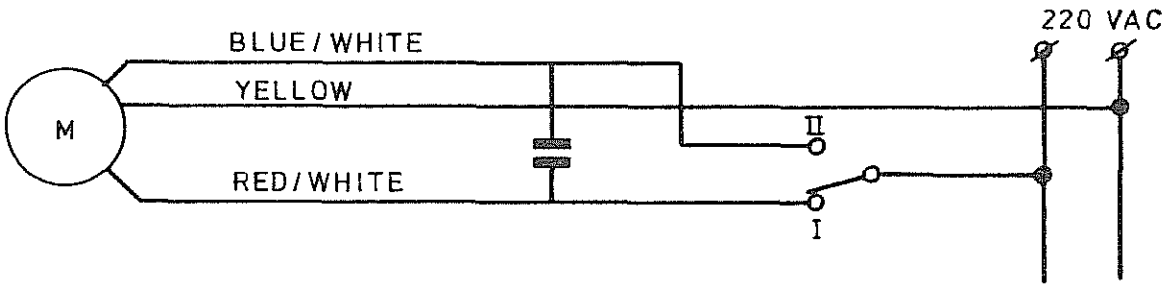
BASE PANEL BOARD



DEFLECTION COIL

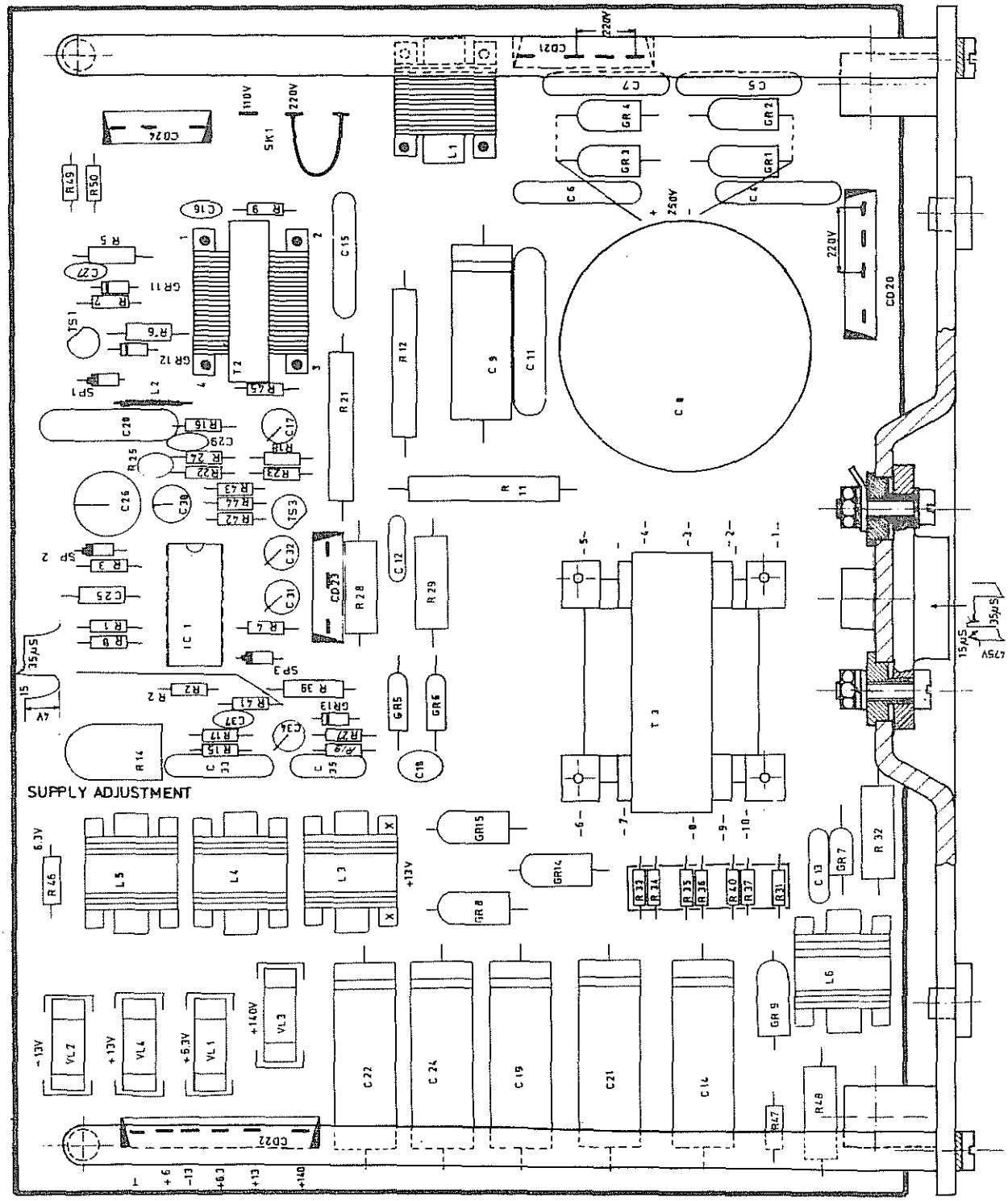


SUPPLY: 220 V -50/60 Hz
4 Watt
WEIGHT : 550 grams



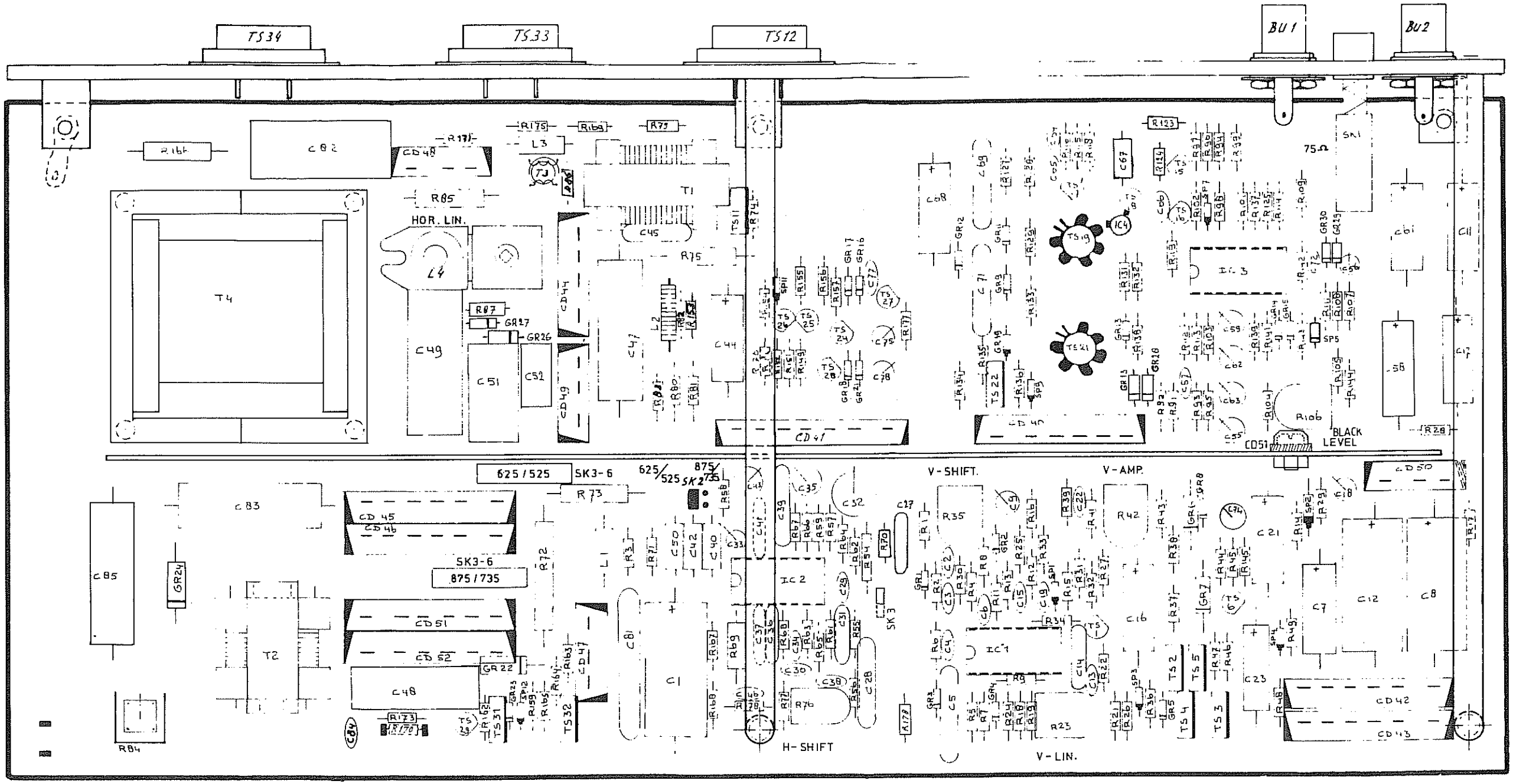
CONNECTION DIAGRAM

DEFLECTION COIL
MOTOR ASSEMBLY

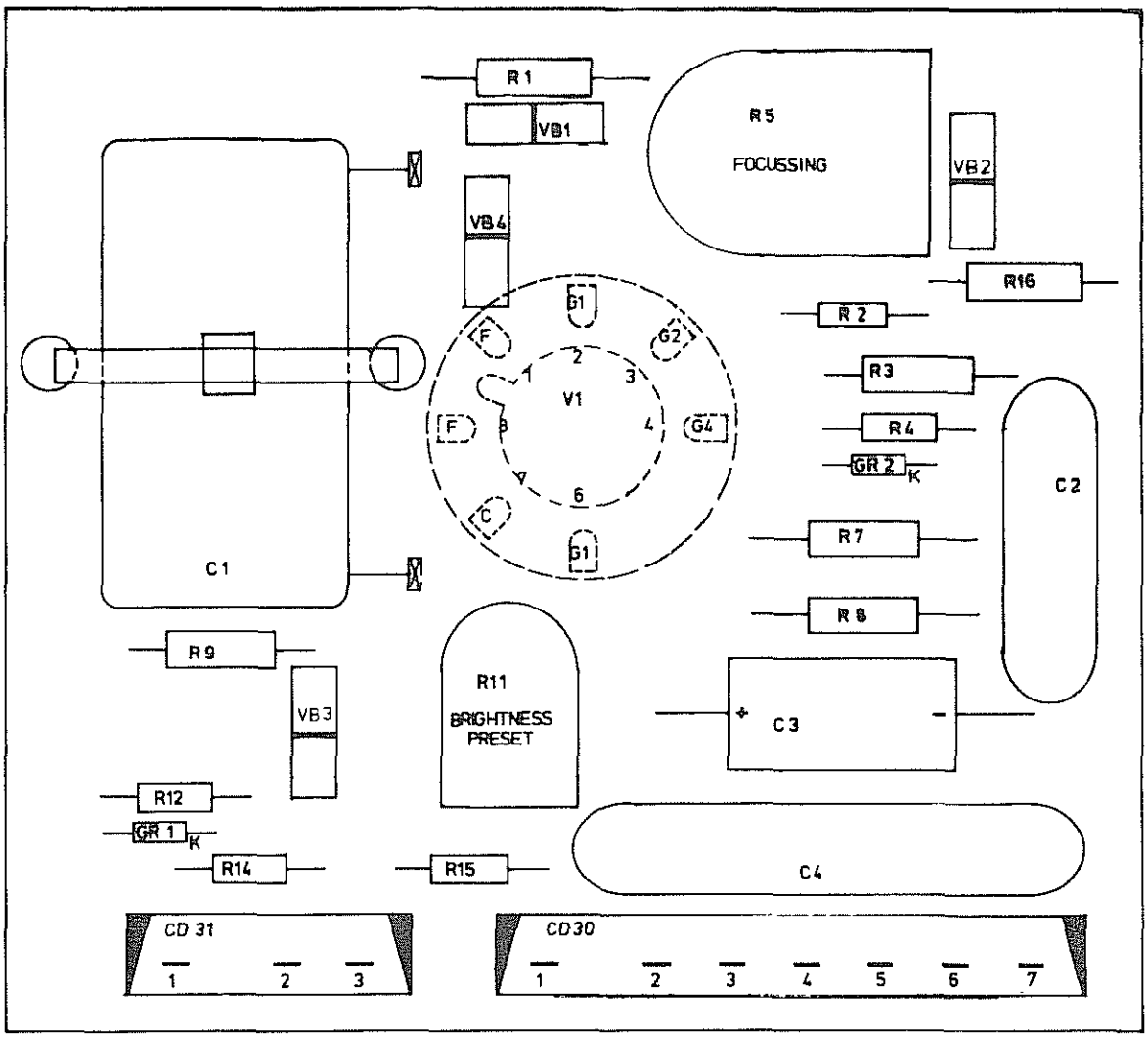


SUPPLY UNIT

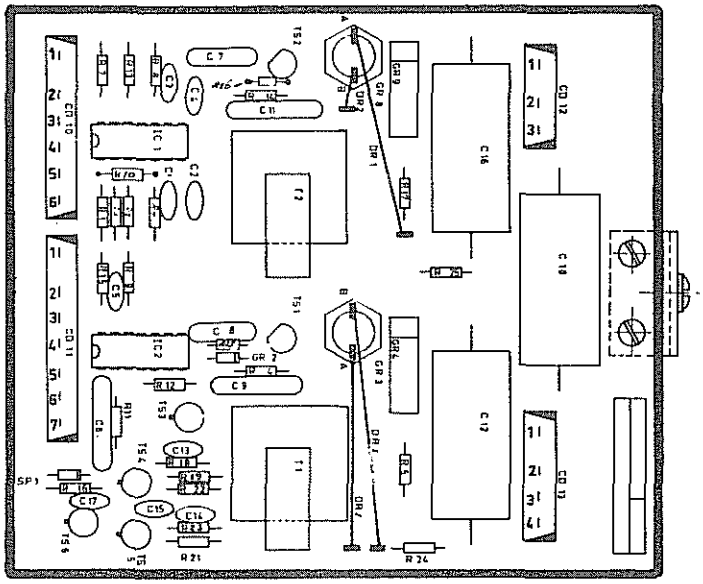
20" MONITOR

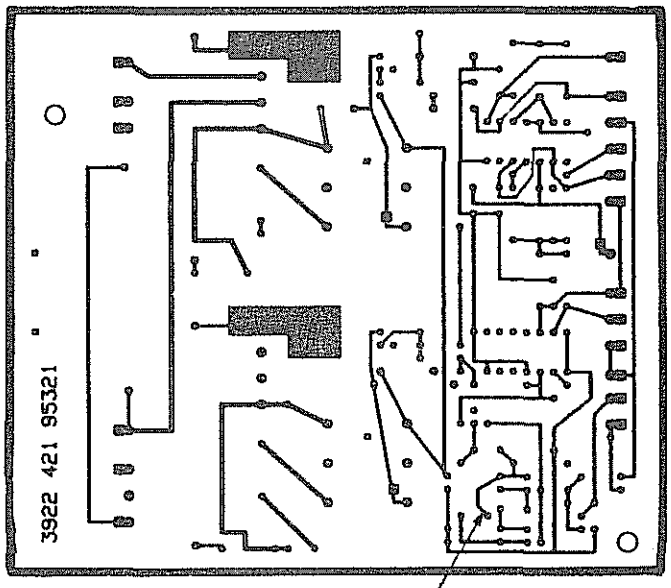


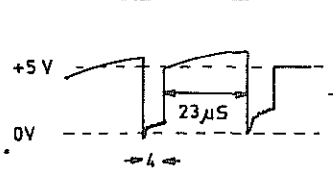
VIDEO AMPLIFIER



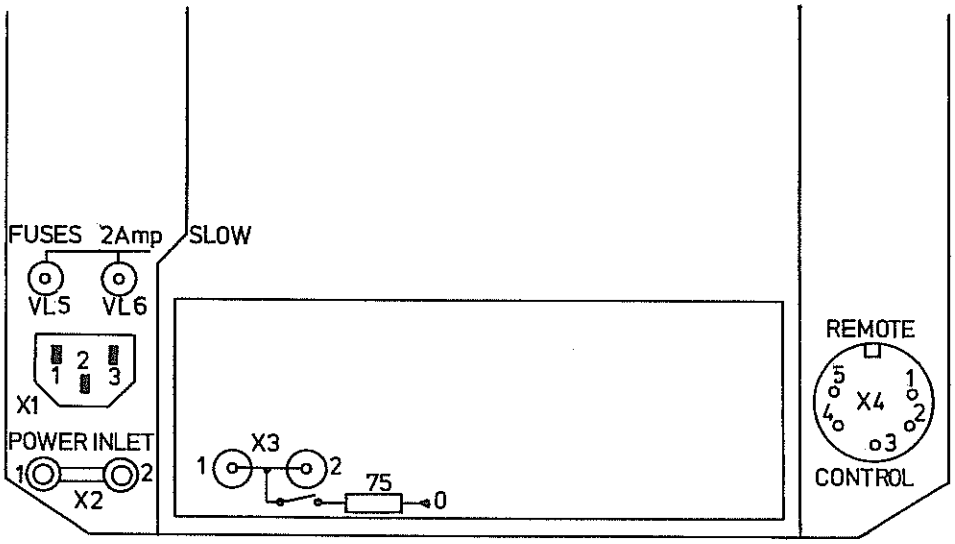
TUBE BASE BOARD







MOTOR SUPPLY UNIT
ONLY IN /01

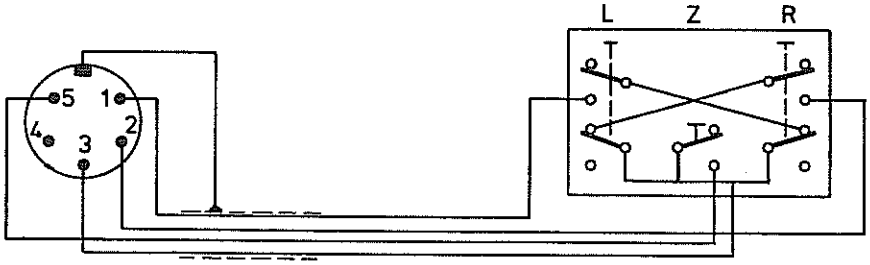


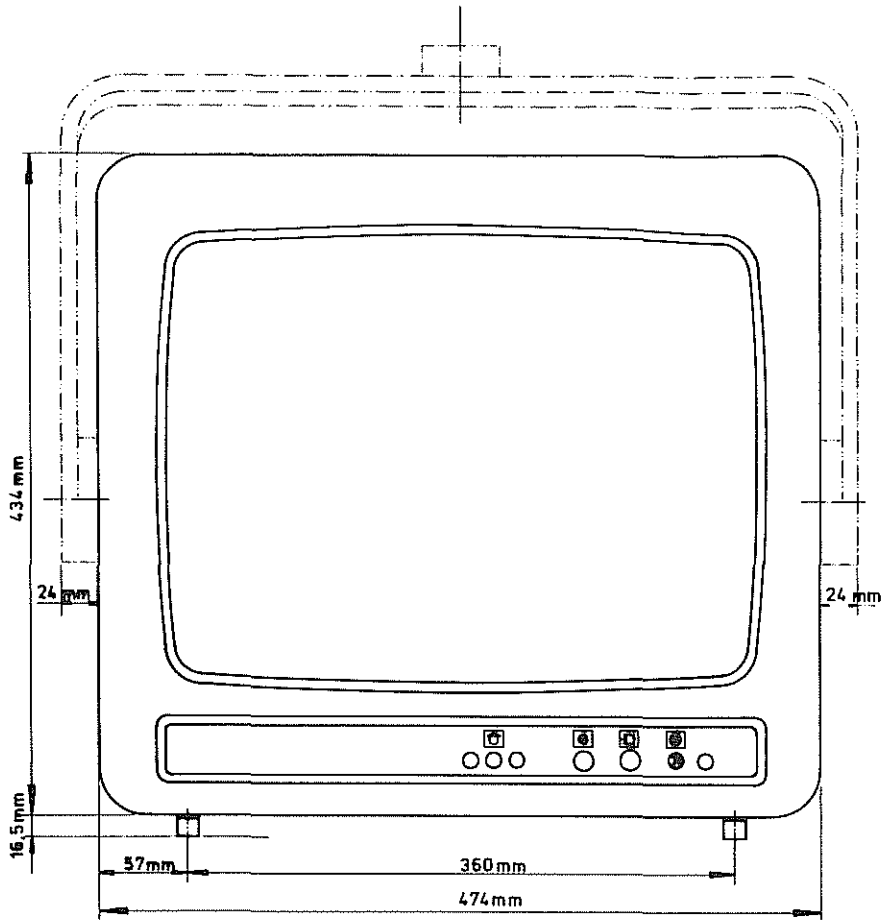
X1	POWER INLET
1	MAINS SUPPLY
2	PROTECTIVE EARTH
3	MAINS SUPPLY

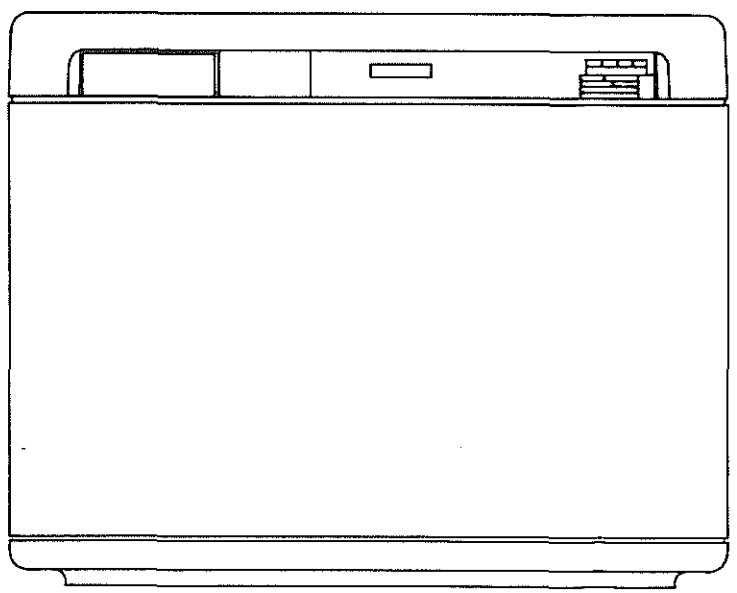
X4	REMOTE CONTROL (/01)
1	L SWITCH
2	R SWITCH
5	Z SWITCH
3	NEUTRAL (NOT GROUND)
4	NOT CONNECTED

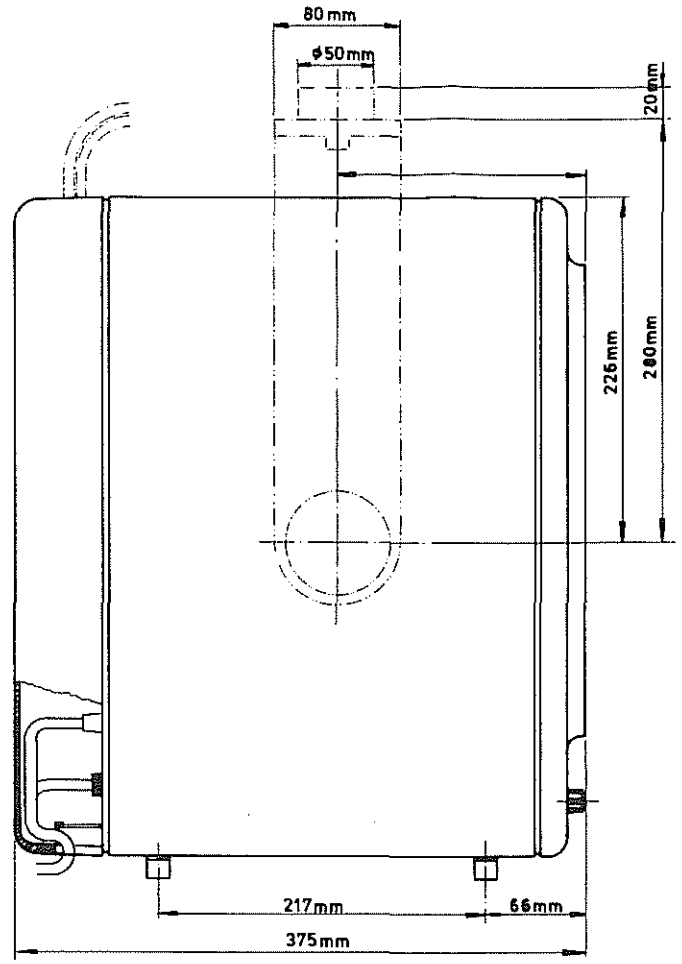
X2	GROUND
1	EXTRA PROTECTED EARTH TERMINAL

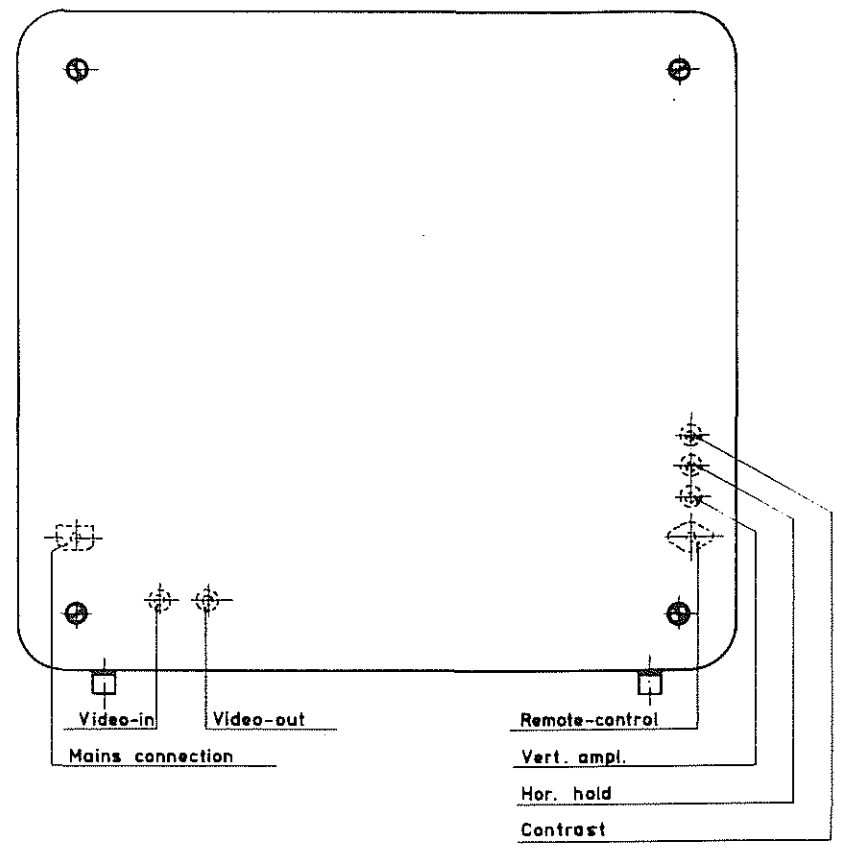
X3	VIDEO INPUT LOOPTHROUGH SOCKETS
1	VIDEO FROM CONTROL UNIT
2	VIDEO TO NEXT MONITOR











WEIGHT: 26 kg

20" MONITOR

DEMENSIONS AND WEIGHTS

20-INCH MONITOR 9807 750 2..01

SERVICE KIT 3922 426 52751

MOUNTING INSTRUCTIONS

4522 980 32121

1) Remove the following from the monitor:

   a) Back cover
   b) Mains supply plug
   c) Video BNC plug
   d) Remote control plug

2) Unscrew safety ground wire from the monitor hood; remove the hood.

3) At the monitor housing (See Detail 1, Figure 1), remove the 3 screws at points labeled "A" to release the mains power subassembly.

4) Place the mains power subassembly with the components facing-up as shown in Detail 1, Figure 1.

NOTE

If necessary, make the square opening in the monitor housing larger with a file.

5) Unsolder the safety ground wire connected between the monitor housing and the mains power subassembly at point labelled "B" (See Detail 1, Figure 1).

6) Remove the cap from mains power subassembly. (Remove screw (3) at points "C" as indicated in Detail 2, Figure 1).

7) To remove the mains supply socket, clip through the two wires connected to the fuses and remove the two screws that secure the mains supply socket to the mains power subassembly.

8) Install the new mains supply socket (delivered with this service kit) using the two spacers and two screws. (See Detail 2, Figure 1).

9) Solder the two wires leading from points E and F to the two fuses as shown in Detail 2, Figure 1.

10) Resolder the safety ground wire that was connected between the monitor housing and the mains power subassembly at point G as shown in Detail 2, Figure 1.

11) Thread the safety ground wire connected at point G through the mains power subassembly cap.

12) Attach the cap with 3 screws at points C.

13) Replace the mains power subassembly and secure with 3 screws at point A.

14) Solder safety ground wire to point B.

15) Connect wire M to ground strip as shown in Detail 3, Figure 1.

16) Remove screw K (Detail 1, Figure 1) to fasten the other end of wire M and a ground-washer at this point.

CAUTION

Re-install the insulation material to isolate point B from monitor housing.

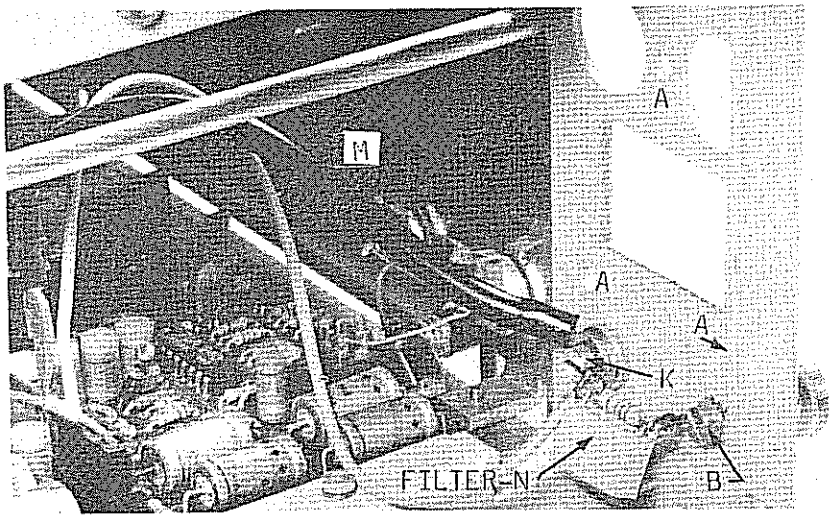
17) Solder filter "N" in place as shown in Detail 1, Figure 1.

18) Replace the monitor hood.

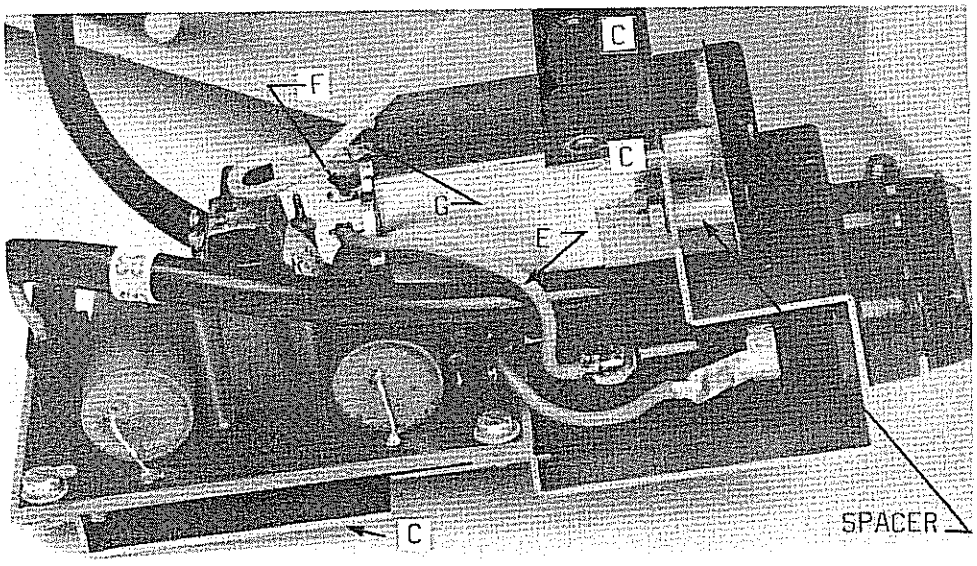
19) Reconnect the other safety ground wire from point B to the monitor hood.

20) Re-connect the mains supply safety plug, video BNC plug, and remote control plug.

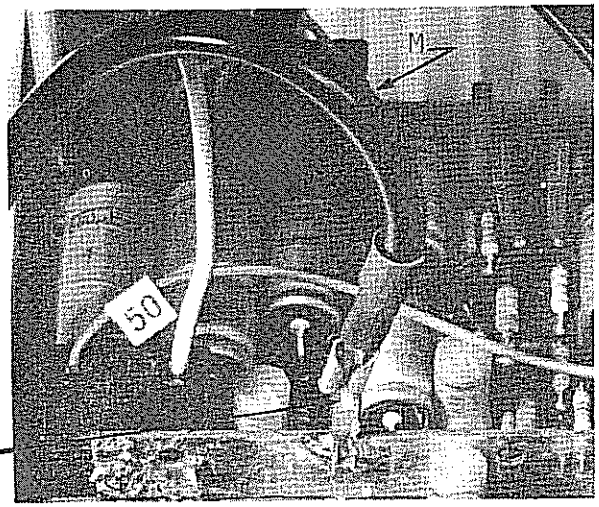
21) Replace monitor back cover.



DETAIL 1 : MONITOR HOUSING POINTS



DETAIL 2 : MAINS POWER SUBASSEMBLY



DETAIL 3 : PUSH-FITTING AND GROUND STRIP

Figure 1

20-INCH MONITOR 9807 750 2..01

RETROFIT KIT 3922 426 52941

MOUNTING INSTRUCTIONS

4522 980 33581

All alterations have to be carried out on video amplifier board 3922 426 51961. See also Documentation for this monitor: diagram 9807 750 2..01 - Z1.1 - 77.1.

Alterations:

1. Replace R138 (10 k) with GR28 (BAW62, code number 9331 012 20112); cathode to base of TS21.
2. Replace SP8 (BZX79C12) with BAW62 (code number 9331 012 20112) with cathode to earth.
3. Replace R135 (100 k) with 23k7 (code number 2322 151 22373).
4. Replace R136 (10 k) with 5k62 (code number 2322 151 25622).
5. Replace R125 (1k5) with 750 ohms (code number 2322 151 27501).
6. Replace R119 (4k7) with 2k74 (code number 2322 151 52742).
7. Add C86 (22 nF, code nr. 2222 629 03223), parallel to GR9 + GR11.
8. Remove R133 (100 ohms) and replace with jumper 4022 007 45310.

Adjustment procedure:

1. After the monitor has been switched on for at least 10 minutes, adjust the black level of the video signal at the cathode to 90 Volts.
   Adjust with the "Brightness" potentiometer at the monitor front, while contrast is at minimum.
2. Then adjust CRT screen brightness with potentiometer R11 at the tube base board such, that the screen just produces light.

   NOTE: Now maximum brightness that can be achieved with "Brightness" potentiometer at monitor front, is not determined anymore, and can be 100 cd/m^2, for instance.

SERVICE PARTS

Medical Systems Q

20" MONITOR

TYPE NO. 9807 750 20001
9807 750 20101

PHILIPS

Contents Inhalt	Q 00 - 82.0
Explanation of the Q-list Erlauterungen der Q-Liste	Q 01 - 77.0
Monitor 20" fixed 9807 750 20001 Monitor 20" Fest 9807 750 20001	Q1/Q2 - 82.0
Monitor 20" rotatable 9807 750 20101 Monitor 20" Drehend 9807 750 20101	Q1 - 82.0

Explanation of the Q-list

Erläuterungen der Q-Liste

Column 1 Spalte 1	Diagram or drawing No. Schaltbild oder Zeichnungs-Nr.
Column 2 Spalte 2	Index of items Index oder Schaltbildsymbol.
	/Up to and including /Bis einschliesslich
	(The details belong to the same assembly(s) (Die Einzelteilen gehören zu derselbe Zusammenstellung
	)The items have the same description)Die Einzelteile tragen dieselbe Bezeichnung
Column 3 Spalte 3	Designation of material Material Bezeichnung
Column 4 Spalte 4	Technical data Technische Angaben
	C = complete (assembly) C = Zusammenstellung
	P = Poles P = Pole
	D = Detail of assembly D = Detail einer Zusammenstellung
Column 5 Spalte 5	Codenumber (Order no.) Kodenummer (Bestellnr.)
	(.... ... .) For the indicated series, this codenumber will be delivered until stock level is zero. FÜr die angegebene Serien, wird dieses Kodenummer zuerst ausgeliefert bis Lagerbestand gleich nul ist.
Column 6 Spalte 6	Serie No. Serien Nr.
	(x) = This sparepart only to be used for the series indicated. (x) = FÜr die angegebene Serien dieses Ersatzteil nur benutzen.

BLAD PAGE BLATT PÁGINA 1	2	OMSCHRIJVING DESCRIPTION BEZEICHNUNG DESCRIPCIÓN 3	4	CODE NUMMER CODE NUMBER NUMÉRO DE CODE KODE NUMMER NÚMERO DE CÓDIGO 5	6 SERIE, SERIES, SÉRIE
		Text plate (frontside),			
		Tekstplatte (Vorderseite)		3922 423 52982	x
Z1-1	V1)	20" picture tube,20" Bild Röhre	VFWP4	9300 729 60152	x
Z1-1	SK01	Push button switch,Drücktaste		3922 052 02201	x
Z1-1	LA1 (	Lamp,Lampe	6,3V, 40mA	9236 700 11203	x
	(	Socket,Fassung		4522 100 54861	x
	(	Lens (green),Linse (Grün)		4522 102 41222	x
Z1-1	R1)	Potentiometer,Potentiometer	1K	4822 101 20455	x
Z1-1	R2)		10K	4822 101 20441	x
Z1-1	R3)		2K2	4822 101 20431	x
Z1-1	R4)		470E	2322 380 01503	x
Z1-1	R5)		47K	2322 380 01009	x
	()	Knob,Knopf	V.R1,R4	4022 006 51011	x
Z3-1		Supply unit,Stromversorgungseinheit		3922 426 51972	x
Z1.2	T1	Filter board assembly,			
		Netzfilter Einheit		3922 426 51991	x
Z1-2	WE5,6 (	Fuse,Sicherung	2A, 250 V	2422 086 00181	x
	(	Fuse holder,Sicherungshalter		2422 092 00006	x
Z3-2		Video amplifier,Video Verstärker		3922 426 51963	x
Z3-3	)	Tube base board assembly,			
	)	Röhre Fassung Einheit		3922 426 52003	x

MONITOR 20" FIXED
MONITOR 20" FEST
TYPE NO. 9807 750 20001

MONITOR 20" FIXED
MONITOR 20" FEST

TYPE NO. 9807 750 20001

1 BLAD / PAGE / BLATT / PÁGINA	2	3 OMSCHRIJVING / DESCRIPTION / BEZEICHNUNG / DESCRIPCIÓN	4	5 CODE NUMMER / CODE NUMBER / NUMÉRO DE CODE / KODE NUMMER / NÚMERO DE CÓDIGO	6 SERIE, SERIES, SÉRIE					
MZ2.2	TS12,34	Diode,Diode	BU 205		x					
MZ2.2	TS2,12		BU 126		x					
Z1.1	)	Deflection coil assembly,		3922 426 52162						
	)	Ablenkungs Spule Einheit			x					
		Cord set,Netzschnur		5722 660 23463	x					
	)	Coax cable and plugs,		3913 426 07641	x					
	)	Koax Kabel und Steckern								

MONITOR 20" ROTATABLE
MONITOR 20" DREHEND
TYPE NO. 9807 750 20101

BLAD PAGE BLATT PÁGINA 1	2	OMSCHRIJVING DESCRIPTION BEZEICHNUNG DESCRIPCIÓN 3	4	CODE NUMMER 5 CODE NUMBER NUMÉRO DE CODE KODE NUMMER NÚMERO DE CÓDIGO	6 SERIE, SERIES, SÉRIE
	)	See Q list 9807 750 20001 completed with			
	)	Siehe Q-Liste 9807 750 20001 angefüllt mit			
MZ1.1.	)	Text plate (frontside)			
	)	Tekstplatte (Vorderseite)		3922 426 52972	x
MZ1.1.	L, M, R	Pushbutton switch, Drücktaste	SK2/4	3922 052 02191	x
MZ2.2.	)	Deflection coil assembly			
	)	Ablenkungsspule Einheit		3922 426 52161	x
MZ2.2.		Motor with reduction, Motor mit Untersetzung		3922 071 00642	x
MZ2.2.		Gear wheel plate, Zahnrad Platte		3922 420 50442	x
MZ2.2.		Gear wheel, Zahnrad		3922 420 50401	x
MZ2.2.		Motor bracket, Motor Ausleger		3922 426 51901	x
Z1-3	)	Motor supply unit,			
	)	Motor Stromverzorgungs Einheit		3922 426 51982	x

FILING INSTRUCTIONS

This manual is part of the service documentation set for the XTV5 FB TV Chain. It should be filed (together with documentation for (a) XTV5 Camera FB/HFB 4522 161 5024., and (b) XTV5 Camera Control Unit FB 4522 161 5028.) with the service manual for the: BV25

Note: All relevant information (e.g. Adjustment procedures) for PEI 9807 733 4..01 can be found in this service manual for the BV25.

Additional binders can be ordered from IPC Eindhoven:

Capacity	Code Number
20 mm	4522 980 32141
26 mm	4522 980 31631
50 mm	4522 980 31641
65 mm	4522 980 31651

SERVICE MANUAL-COMBINED UNITS
XTV5-FB
TYPE NR: 9807 733 4..01

SERIAL NR:

LIST OF PAGES AND DRAWINGS

1 (85.0)
2 (85.0)

P-List

* PRINTING INSTRUCTIONS: 4522 983 10411

SERVICE MANUAL-COMBINED UNITS

XTV5-FB

PEI 9807 733 4..01

For serial numbers, see list of pages and drawings

IPC: Eindhoven

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Printed in The Netherlands (85.0)

SERVICE PARTSLIST UNIT

PEI: 9807 733 41001

DESCRIPTION: TV CHAIN XTV-5 "FB" for BV25

SERIAL NR:

List of pages and drawings

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P-1 (89-1)

P-2 (89-1)

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005	WK	.	* FIBER CAMERA "SF/FB" *	
010	WK 1	4522 107 71316	VERTICAL DEFLECTION	
015	WK 2	4522 107 68411	PRE-AMPLIFIER	
020	WK 3	4522 107 71357	HORIZONTAL DEFLECTION	
025	WK 4	4522 107 71411	HIGH VOLTAGE	
030	WK 5	4522 107 71454	BACK PANEL FIBER	
035	WK 6	4522 107 71505	TUBE INTERFACE	
040		4522 161 18461	ROD	
045		3122 137 18642	PLUMBICON DEFL.UNIT	
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SCHEME/ PAGE	INDEX	CODENUMBER	DESCRIPTION	DATA
055	WN	.	*CAMERA CONTROL UNIT"FB"*	
060	WN 10	4522 107 88001	BACK PANEL	
065	WN 11	4522 107 71162	CAMERA CONTROL	
070	WN 13	4522 107 75509	VIDEO PROCESSING	
075	WN 17	4522 107 70906	AGC + DACURR	
080	WN 19	4522 107 71013	IMPULSE GENERATOR "Q"	
085	WN 21	4522 107 70956	MONTORING	
090	WN 22	4522 107 70856	KV CONTROL	
095	WN 23	4522 107 87951	ADAPTATION BV25	
100		4522 103 67202	EXTENSION CABLE	

FILING INSTRUCTIONS

File this documentation in binder 3:
XTV of the Subsystem Documentation
IMAGE DETECTION AND DISPLAY.

9807 751 5..01

HM(R) 20S 20" TV MONITOR

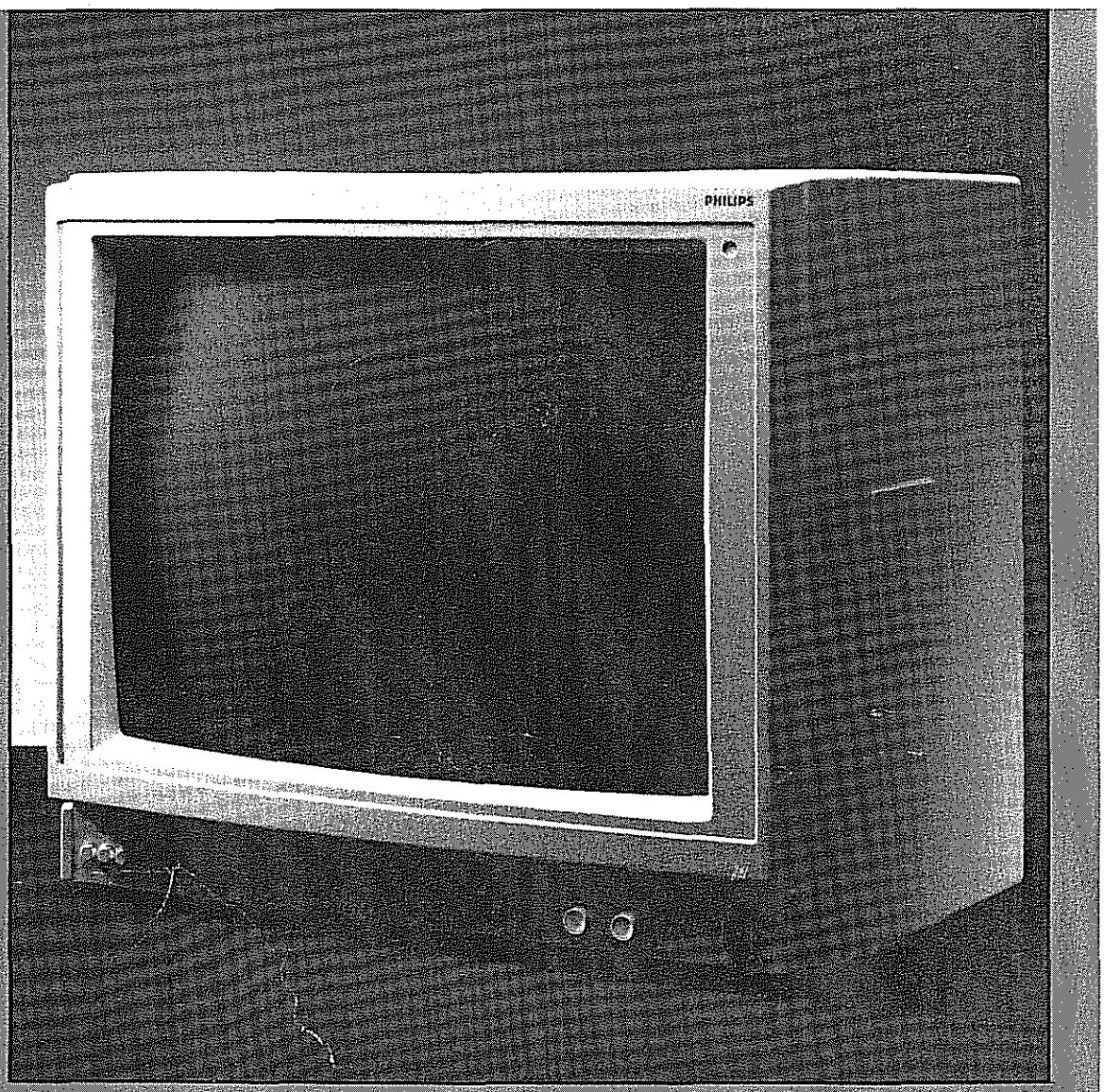
PHILIPS

PHILIPS

Philips Medical Systems

TV monitors HM 20S and HMR 20S

Operator's manual



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Safety precautions	2
Operation	3
Maintenance	4
Legend	4

This manual is intended to assist the user in the safe and efficient use of the equipment described in it. Before operating the equipment, the user should read this manual thoroughly, paying particular attention to the Safety Precautions which follow and to all the Warnings, Cautions and Notes given elsewhere in the text.

When reading this manual, the user should refer also to the illustrations and legend on page 4, as these constitute an essential part of the instructions contained in it.

It is the responsibility of the user to ensure observance of all legal regulations concerning both the building in which the equipment is installed and the equipment itself. The equipment must be used in accordance with the procedures contained in this manual and should be used only by persons with recognized relevant qualifications and adequate training on this particular type of equipment.

The equipment must not be used for purposes other than those described in this manual. Incorrect use or failure by the user to maintain the equipment in accordance with the maintenance instructions given in this manual relieves the manufacturer and his agents of all responsibility for any consequent non-compliance, injury, damage or defect.

WARNING: Disregard of these precautions may result in fatal or serious injury.

GENERAL

The equipment must not be used if any component is defective.

Changes in or additions to the equipment may be carried out only by Philips or by third parties authorized by Philips to do so. Such changes or additions must comply with local regulations and with the accepted standards of engineering practice.

The equipment must not be used in combination with other equipment unless that equipment is designated as compatible with it by Philips or an associated Company.

ELECTRICAL SAFETY

The equipment must be used only in rooms which comply with the national and international regulations concerning safety in rooms used for medical purposes, in particular those concerning provision of a protective earth (ground) terminal for equi-potential connection of equipments.

Always switch OFF the relevant part of the equipment and isolate that part from the a.c. supply before removing any cover. Only qualified service personnel should be allowed to connect or remove any high voltage cable or to gain access to the interior of any assembly to which high voltage is connected, either by removing covers or in any other way.

Never allow any liquid or aerosol to enter the equipment, as these may cause short circuits or corrosion or both.

EXPLOSION SAFETY

It is not safe to operate this equipment in the presence of explosive or inflammable vapour, gas or aerosols. In this context, it must be remembered that certain disinfectants can constitute such a hazard. Before using such a substance in the room where this equipment is installed, the equipment must be switched off and allowed to cool down to prevent its ingress through convection. The equipment must remain switched off until all traces of the substance have dispersed from the atmosphere of the room.

Position of the Monitor
The monitor may be tilted to an angle of up to 45° in any direction when suitably mounted. For optimal viewing, the monitor should be placed so as to eliminate reflections of light sources in the screen.

Environmental Conditions
Temperature
- storage and transportation: -25 to +70 °C
- operation : +10 to +45 °C

Humidity: not more than 90% during operation.

Electrical Supply
220 V, 50/60 Hz

Electrical Connections
The TV Monitor requires the following inputs:
- o a.c. supply with an associated ground (earth) wire
- o composite video input
- o for HMR 20S: optional rotation control signals (TTL compatible). (Rotation can also be controlled from the monitor, see Legend).

The monitor provides a loop-through video output.

All these electrical connections are made behind the rear panel of the monitor by a service technician on installation and the leads are fed through this panel in a cable hose. If it should be necessary to disconnect the monitor in order to relocate it, the necessary disconnection and re-connection should be done by a service technician.

Power Switching
The a.c.supply to the TV Monitor is switched by the alternate-action power switch (Legend 2) which is illuminated (green) when set to ON with the supply present. This provides the means to switch the monitor off while the system which provides the supply remains on.

Video Matching
The monitor incorporates a switchable matching device of 75 ohms and the same switch connects or disconnects the video output. This switch is inside the cabinet and is set by the service technician, who should be called to check the setting in accordance with the Service Manual if the video network arrangements are subsequently altered.

TV System
525/1049 lines, 50/100 Hz frame rate for 50 Hz supply
625/1249 lines, 60/120 Hz frame rate for 60 Hz supply

0.5 to 2.0 Vpp composite video signal.

Aspect ratio 3:4 for standard (525/625) line rate, 3:4 or 1:1 for high (1049/1249) line rate.

Internal Settings of Frame Rate and Aspect Ratio
The monitor is preset at the factory for frame rates of 50 Hz and 60 Hz (in correspondence to the supply frequency) and for an aspect ratio of 3:4.

If 100/120 Hz frame rate or 1:1 aspect ratio for high line rate (1049/1249 lines) is required, the necessary internal adjustments need to be made by a service technician in accordance with instructions in the Service Manual.

Automatic Switching of Line Rate
The monitor detects the line rate of the input TV signal and switches itself automatically to operate at the corresponding line rate.

Brightness and Contrast Control
The monitor has an automatic brightness and contrast control circuit which works in association with manual controls on the front panel (Legend 3 and 4). The automatic control circuit detects the background light level by means of a photo-electric sensor (Legend 1) and adjusts both brightness and contrast to compensate instantaneously for any change in light level, thus maintaining the appearance of the image, as selected by means of the manual controls, if the room lighting changes for any reason.

The manual brightness and contrast controls are factory set to give the optimal range of brightness and contrast for video signals of 1 Vpp, as delivered by any of the medical imaging systems with which the monitor is normally associated. At these settings, the automatic control circuit provides its optimal range of control and can compensate for any level of ambient light likely to be encountered. Click stops on both controls are also factory set to allow the optimal control settings to be easily reinstated if they should be disturbed.

The spindles of the brightness and contrast controls are slotted to permit screwdriver adjustment by a service technician although knobs can be fitted if required. If the knobs are not in place, the holes in the front of the cabinet which accommodate them are blanked off with covers which can be removed by the service technician to reach the screwdriver slots or to fit the knobs.

Since, for most applications, no user adjustment is necessary, the HM 20S model is delivered with the knobs dismounted but these may be fitted during installation on special request of the user. However, the HMR 20S model is delivered with the knobs already mounted because, in the applications in which rotation is used, there is sometimes a requirement to change the brightness from the conventional setting in order to emphasise a particular aspect of the image.

NOTE: In the absence of such an operational requirement, it is recommended to operate with the knobs dismounted, since then there is no chance of inadvertent mis-setting. Adjustment of brightness or contrast or both to other than the factory settings degrades the performance of the automatic brightness and contrast control circuit and reduces its range of control. Therefore, for normal operation, ensure that the click stops are engaged on both controls.

Image Rotation (HMR 20S only)
The TV Monitor HMR 20S is equipped with an image rotation facility which may be subject to remote control. The zero position (no displacement) is automatically assumed on switching on the monitor except when remote control is implemented and this calls for some other orientation. Local control of image orientation is provided by three push buttons on the left-hand side of the front panel (Legend 5).

Operation of the central button causes the image to adopt the zero position rapidly. Operation of the push button on the right causes continuous image rotation at a slower rate in a clockwise direction, so long as the push button is depressed. The push button on the left has the opposite effect.

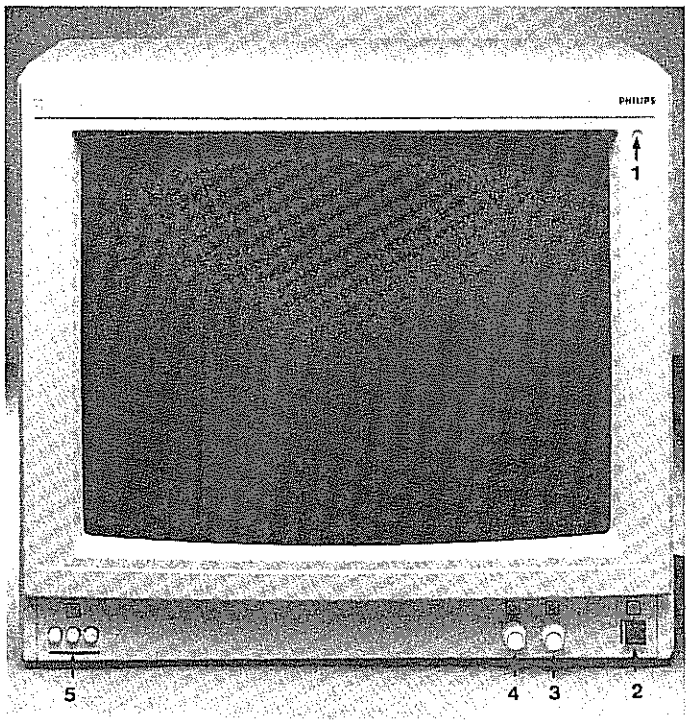
If remote control is implemented, it acts in parallel with the front panel controls, which maintain their normal roles.

TV Monitors HM 20S and HMR 20S require no periodic maintenance other than occasional cleaning of the cabinet and screen, and disinfection, as required. There are no user-serviceable parts inside the cabinet.

Cleaning and Disinfection
To clean or disinfect the cabinet or screen of the TV monitor, wipe over with a soft, lint-free cloth moistened with alcohol or a mild domestic cleaning agent or a non-corrosive disinfectant solution, as appropriate, and dry off with a similar cloth which is clean and dry (and sterile if required).

LEGEND

1. Light Sensor for automatic brightness and contrast control
2. Power ON/OFF switch with green indicator.
3. Brightness Control (knob may be removed)
4. Contrast Control (knob may be removed)
5. Rotation controls (HMR 20S only)



SERVICE MANUAL-UNIT

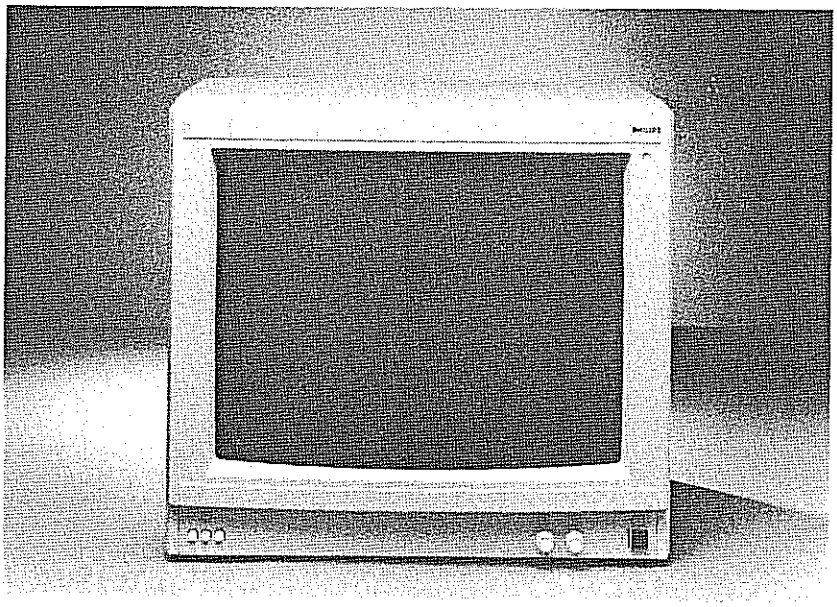
HM(R)20S 20" TV Monitor

9807 751 5..01

For serial numbers, see list of pages and drawings

WARNING

TO REDUCE THE RISK OF FIRE OR ELECTRIC SHOCK.
DO NOT EXPOSE THIS APPLIANCE TO WET LOCATIONS.
SEE ALSO SAFETY INFORMATION FOLLOWING THIS PAGE.



IPC: Best

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Printed in The Netherlands (88.0)

SERVICE SAFETY INFORMATION

1. All work on the exposed monitor chassis shall be performed by qualified service personnel only. No work should be attempted without carefully consulting this manual.

2. The rotatable version of this monitor has a rotation motor and a motor drive p.c.b. which are connected to the mains supply.
   In case of servicing those units an isolation transformer should always be used.

3. It is advised to ground the chassis during any service handling. Check the interconnection of the two earth screws (safety earth and functional earth) located at the back side of the monitor behind the back cover.
   When working on the exposed chassis use only one hand during testing to avoid severe electrical shock.

4. As rough handling of the picture tube may cause implosion it should be handled with great care.
   The use of safety goggles and protective gloves is strongly advised.
   Replace the picture tube only with the type Philips M47EAA27WW picture tube; see also clause 9.

5. As possibly danger of personal injury might result from unnecessary exposure to X-ray radiation generated by the picture tube, prolonged exposure at close range to unshielded areas of the picture tube should be avoided.

6. In case of repair, always switch off the monitor first.
   After switching off, wait at least 30 seconds, because the monitor has a self-discharging Cathode Ray Tube which takes 30 seconds to discharge.
   The only electrical parts of the monitor that may be exchanged are printed circuit boards.
   After exchanging printed circuit boards which might influence the high voltage of the monitor, the value of this voltage shall be checked to be 19 $\pm$ 1 kV.
   If a deviating value is found, it shall be corrected by adjusting R8, R7 and R201 on WM10 along the lines of the test instructions.

7. After exchanging PCB's in the supply unit, check the voltage on X1:1 to be +120 $\pm$ 1 Volt.
   If a deviating value is found, readjust R1 on WM20.
   Use only an isolated screw driver.

8. The monitor is supplied connected for 220 V mains supply only.
   The mains cord, being a part of the cable harness (see Z2-2: cable harness) must be connected according to the relevant System Documentation.
   The mains cord contains 3 wires. Their colours indicate the following:
   GREEN (GN) : SAFETY EARTH
   BLACK (BK) }
   WHITE (WH) } : 220 Volt

9. The monitor shall be installed at least 6 feet (1,83 m.) beyond the perimeter of the patient's bed, or table etc., and at least 7,5 feet (2,29 m.) above the floor.

10a. All components, indicated on the schematics with ⚠ have safety functions. They may only be replaced by components having exactly the same properties. This can only be guaranteed if the same manufacturer or supplier is used.

10b. Normal repair of the monitor shall be carried out by exchanging complete Printed Circuit Boards.
If repair on a Board is unavoidable, refer to manufacturer's parts list for safety critical components as mentioned under 10a.

11. When mounting the cable harness (9807 750 31101), make sure the protective sleeve of the harness does not stick into the monitor for more than 1 cm. Lengths of cables from the cable harness inside the monitor must be kept as short as possible.
Cables should be drawn back if, e.g. during transport, the sleeve has been shifted too much.

12. Before returning the serviced monitor to a client or before reputting it into operation at least the following safety tests should be performed:

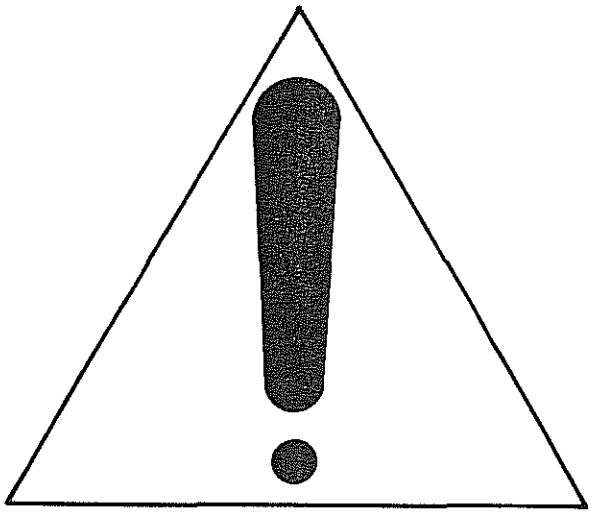
a. Earth continuity test:
An ohm meter is used to measure the resistance between each separate accessible metal part and the earth connection of the mains inlet.
All measured values should be $\leq$ 0,1 Ohm.

b. Earth leakage test:
An AC meter with an impedance of 1500 ohm, shunted by 0,15/uF is connected between the safety earth screw and the earth connection of the wall outlet.
During this measurement the monitor may not be connected to the mains earth connection.
The measured value should be $\leq$ 0,7 Volt.

WARNING

In case of a defect in the monitor, the enclosure may be under voltage stress, if the measured voltage is over the indicated value.

13. This monitor is supplied with 2 fuses, 2 spare fuses and a copper bar. When using the monitor with a mains plug which can be reversed, both phase and neutral must be fused.
In all other cases only the phase (L) must be fused and the copper bar must be inserted into the neutral (N) fuseholder. If not indicated, to be determined by measuring with a low impedance ohm measuring device, or voltage measuring device. (IEC 601).



The exclamation point within an equilateral triangle is intended to alert the user to the presence of important operating and maintenance (servicing) instructions in the literature accompanying the appliance.

An appliance and cart combination should be moved with care. Quick stops, excessive force, and uneven surfaces may cause the appliance and cart combination to overturn.

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INSTALLATION B

SETTING TO WORK C

ACCEPTANCE D

PREVENTIVE MAINTENANCE E

CORRECTIVE MAINTENANCE F

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SERVICE MANUAL UNIT
HM(R)20S 20" TV MONITOR
TYPE NR: 9807 751 5..01

SERIAL NR: 1654220-367

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1. GENERAL

1.1. SCOPE OF PRODUCT

This section describes the performance of a high resolution dual standard TV monitor for display of monochrome video signals.
The monitor is considered to be a segment of the X-ray TV system.
Styling is in correspondence with this environment.
The monitor is mechanically compatible with TV monitors 9807 750 2..01, 9807 750 8..01, 9807 751 50001 and 9807 751 50101.
The normal 50Hz version (NON-ROTATABLE IMAGE) has the code nr. 9807 751 51601, while the normal 60Hz version has code nr. 9807 751 51501.
The rotatable 50Hz version has the code nr. 9807 751 51401, while the rotatable 60Hz version has the code nr. 9807 751 51301.
All monitor types have ambient light controlled brightness and contrast.
The product is a non-dividable functional unit. All properties can be easily verified.

1.2. BASIC PROPERTIES

The monitor is equipped with a 20 inch high resolution tube M47EAA27WW, deflection angle 110 degrees. The monitor will accept both standard TV signals and high resolution signals. Switching over is done automatically.
Without an input signal the monitor will switch to low lines.
In the high resolution mode, an aspect ratio of 3:4 or 1:1 can be selected by internal jumpers. After changing the aspect ratio readjustment of the picture width and geometry will not be necessary.
The monitor can display 100/120 Hz pictures by internal jumpering. Readjustment of picture height will be necessary after changing jumper setting.

2. DEFINITION OF TERMS

- STANDARD SIGNALS are video signals that comply with CCIR or EIA broadcast standards.

- NON-STANDARD SIGNALS are video signals that do not exactly meet the CCIR or EIA standard. Possible deviations are:
  - o absence of equalizing pulses
  - o line and frame frequency, up to max. +/- 4%
  - o set up levels
  - o fall and rise times of synchronization pulses
  - o non-standard ratio of video/sync.

3. TECHNICAL REQUIREMENTS

3.1. OPERATIONAL PERFORMANCE

3.1.1. Electrical

- Power

Supply voltage : 220 V ± 10%
Frequency range : 48~62 Hz
Input power : ca. 65W
CRT high voltage: 18.5 ± 1 kV at zero beam current.
Breathing < 2% from zero to max. beam current.

- Video Amplifier

. The monitor will accept the following input signals:
Standard signals CCIR or EIA.
Non-standard signals with the line and field frequency within the range of CCIR or EIA.
High resolution signals 1249 lines 50 Hz or 1049 lines 60 Hz.
Signals with 100 or 120 Hz field frequency (line frequency 32 KHz).
Separated video and composite synchronization pulse.
Signals from VCR and VTR.

. Input level
Composite video: 0.5 Vpp to 2 Vpp. Nominal 1 Vpp.
Video 0.35 Vpp to 1.4 Vpp; Sync. 0.15 Vpp to 0.6 Vpp.

. Ratio peak video/sync: max. 4.5

. Frequency response maximal deviation from a flat characteristic:
Up to 20 MHz -1dB to +1dB.
At 25 MHz <= -3dB.

. Tilt
Tilt on 50 Hz square wave <= 5%
Tilt on line frequency square wave <= 5%
Overshoot on 250 kHz square wave <= 5%

Figures defined at 100 cd/m^2 peak white level.

. Hum
50% added hum at nominal video level will give no significant picture disturbance.

- Horizontal Deflection

Nominal line frequency 15680 Hz or 31350 Hz.
Synchronization lock and hold: 4%
Flyback time : max. 6 µS
Stability of amplitude : better than 2% of picture height.

- Vertical Deflection

Synchronization: 48 Hz to 62 Hz or 96 Hz to 124 Hz.
Stability of amplitude: better than 2% of picture height.

- Dynamic Focus

Horizontal and vertical dynamic focus is applied.

3.1.2. CRT

- Dark tinted glass with direct grind anti-glare treatment to improve contrast.

- Phosfor WW (standard white) tube M47EAA27WW.

- New generation gun for improved resolution.

- Internal surge limiter reduces flash-over effects.

- Display Size

280 x 280 mm or 280 x 360 mm

- Aspect Ratio

In Low Line Rate mode an aspect ratio of 3:4.
Internal jumper selectable aspect ratio in High Line Rate mode; 1:1 (for XTV5 and XTV6) or 3:4 (for XTV11 and XTV12), without the need for readjustments.

- Interlace Factor

Better than 45:55.

- Geometry

Inside monitor circle better than 1% of picture height.
2% for rotatable version.
Outside monitor circle 2%.

- Resolution

Modulation of 20 MHz bars in the centre >= 20% (high line rate).

- Positional Hum

Peak to peak displacement is less than 0.2% of picture height.

- Picture Position

The theoretical centre of the monitor circle is centered to the displayed area with a maximum deviation of 1% of the picture height.
The rotatable version has an additional deviation of 2% during rotation.
After switching from low to high line rate or back, an additional shift of 1% is allowed.

- Black level

With the black level adjusted to 4 cd/m^2 this level will be reached within 10 minutes.
From picture appearance until stabilization the level will be <= 10 cd/m^2.
Drift versus temperature: <= 2 cd/m^2 over operating temp. range.
Change due to 50% white at 250 cd/m^2: <= 5 cd/m^2.
Black level brightness: max. >= 15 cd/m^2
min. <= -50 cd/m^2.

- White level

front control: max. 600 cd/m^2
min. equal to black level.

- Picture height stability

In all normal operating conditions, including empty tape play back, the picture dimensions shall not drop below 70% of the useful screen dimensions.

3.1.3. Compatibility

- The monitor is compatible with the following systems:
  - o TV CHAIN XTV4
  - o TV CHAIN XTV5
  - o TV CHAIN XTV6
  - o TV CAMERA XTV8
  - o TV CHAIN XTV11
  - o TV CHAIN XTV12
  - o DCI systems
  - o DVI systems
  - o VCR and VTR

- The monitor is compatible with the following suspensions:
  - o Mobile support (9807 606 20001)
  - o Wall support (9807 605 60001)
  - o Ceiling suspension (9807 605 70001)
  - o Yoke (9807 605 90001)
  - o Ceiling suspension for 4 monitors (9807 607 40001)

3.2. MAINTENANCE AND LOGISTICS

- Several measures have been taken to assure good serviceability:
  - o Printed circuit boards can easily be exchanged.
  - o Good accessibility for measuring purposes.
  - o Easy exchange of picture tube.

3.3. OPERABILITY

3.3.1. Reliability

MTBF: 15000 hours excluding picture tube, picture tube 24000 hours.
MTTR: 0.5 hours
Economic life: 7 years

3.3.2. Operational Environment

Temperature range:
+10 to +45 degrees during operation
-25 to +70 degrees during transport

Humidity:
max. 90% during operation

Mains supply:
The monitor will show no significant picture deterioration under the following conditions:
Mains voltage drops of 25% during 10mS.
Mains voltage drops of 100% during 1mS.
Spikes of 500 V on mains voltage according to UXW 13850.

No defects may occur due to voltage spikes of 1000 Vpp according to UXW 13850.

3.4. DESIGN CONSTRAINTS

Applicable Standards and Regulations

- Safety

IEC 601-1
AP requirements only applicable for remote control functions
UL 1410
CSA C22.2

- Electro Magnetic Compatibility

EMC behaviour in accordance with UXW 13850
UXW 13850 covers VDE 0871 (level B)
VDE 0875 (level N)
FCC rules

- X-ray Radiation

The monitor complies with: DHHS
NH+W
RØntgenverordnung

- Mechanical Environment : M1 - Acc. to UXW 13600 -

- Climatic Environment : C1 - Acc. to UXW 13600 -

4. INTERFACES

2 BNC connectors for video with loop-through facility.
When no loop through is required (75 Ohm termination), the second BNC connector can be used for external composite synchronization or parking the second video cable.
1 DIN plug and 1 MOD connector for remote control of rotatable scan system (when applicable).
1 9-pin D connector for remote control of brightness and contrast (when applicable).

5. OPERATION

5.1. NON-ROTATABLE VERSION

Default setting of brightness and contrast adjustment by screwdriver at the front of the monitor via covered holes. Knobs included.
All other adjustments are located inside the monitor and are not user operated.

5.2. ROTATABLE VERSION

Default setting of brightness and contrast adjustment by knobs at the front of the monitor.
All other adjustments are located inside the monitor and are not user operated.
3 switches for left, right and zero position are provided.

6. AMBIENT LIGHT CONTROLLED BRIGHTNESS AND CONTRAST LEVELS

- Control at ambient light levels between 1 and 1000 lux.
- Control characteristics jumper selectable, depending on application.
- Wide field of view optical sensor.

7. ADDITIONAL INFORMATION FOR ROTATABLE VERSION

7.1. FUNCTIONAL DESCRIPTION

The 9807 751 51301 and 9807 751 51401 have the possibility of rotating the image in any desired position. Rotating can be done either by three pushbuttons on the front of the monitor, or by remote control.

7.2. PERFORMANCE

- Mains voltage: 220VAC 50 Hz or 60 Hz only.

- Rotation control:

  - o 3 pushbuttons on the front for left, right and zero.
  - o Remote control via a 10 pole MOD connector (WM60:X1) or 6 pole DIN plug (WM60:X7).

- Zero position: Maximal deviation from the nominal zero position ± 5 degrees. When switching on, the image automatically moves to this position.

- Rotation time: circa 10 seconds.

- Picture position: An extra deviation of the picture position in a rotated position is allowed.

- Operation of the image rotation mechanism shall not generate any visible disturbance in the image (when applicable).

7.3. DESIGN CONSTRAINTS

Apart from standards and regulations mentioned in 4.4., the remote control connections also meet the AP requirements.

Section B: INSTALLATION

CONTENTS

FIG. 1 B-2

1. CABLE ASSIGNMENTS B-3

2. DISMOUNTING AND MOUNTING OF THE CABLE HARNESS B-3

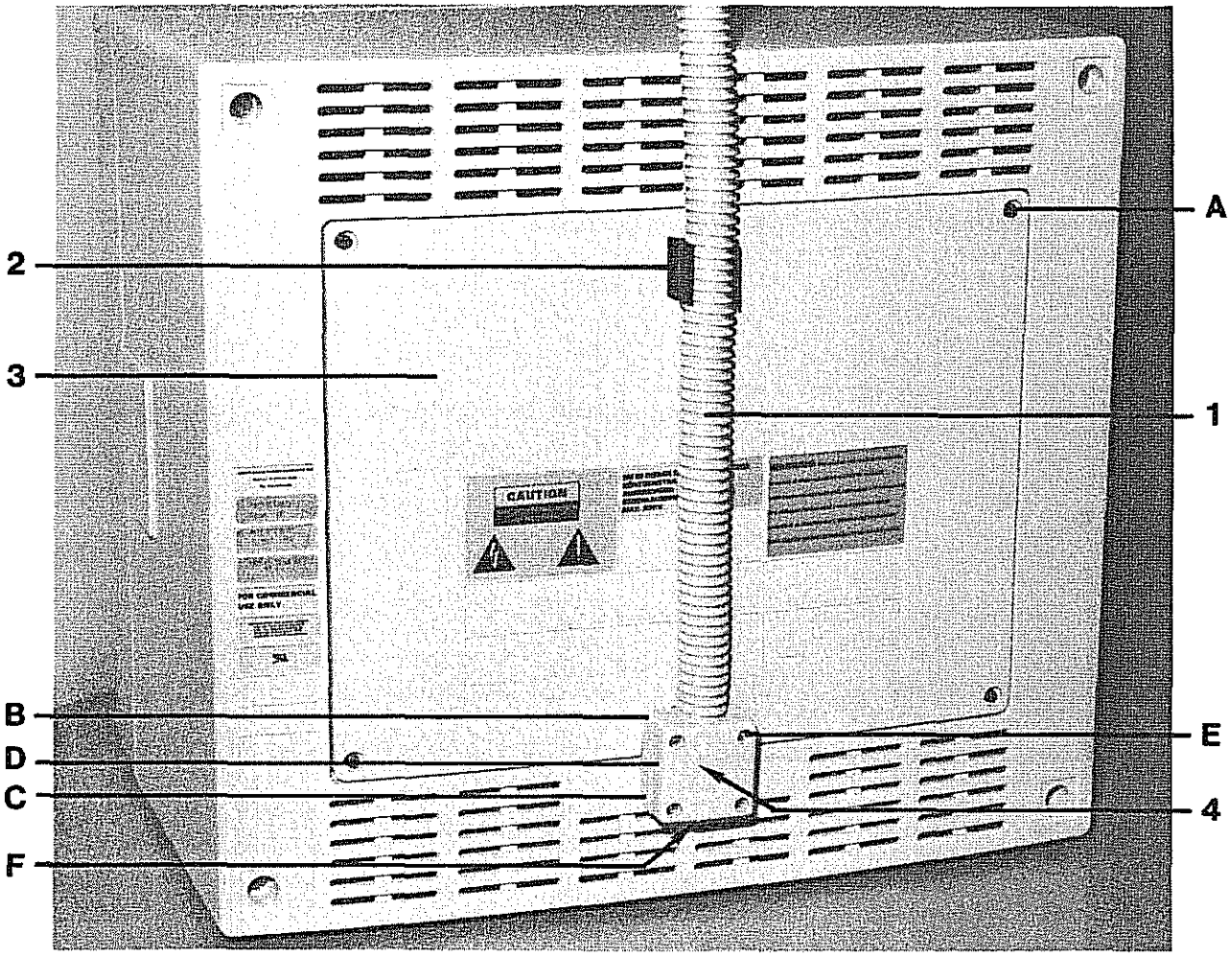


Figure 1 Rear side of monitor

1. CABLE ASSIGNMENTS

WM10:X1 Video IN termination at 75 ohm via S1 if X2 not looped through.
:X2 Video OUT (Loop Through) or External Synchronization not terminated.

NOTE : With cable harness 9807 750 31101 two video cables are provided. If a second monitor or loop through situation is not needed the second video cable can be parked at WM10:X2, provided that WM10:X2 is disconnected from the circuitry by switching S1 to the right, as seen from the rear, and putting W4 on 1-2. Parking the second video cable at WM10:X2, is not allowed for monitor types 9807 751 50001 and 9807 751 50101, otherwise a ghosting will appear on the screen.

WMX1 220VAC Mains
WM1 yel/grn Ground
WM60:X1 MOD connection for remote control of rotation system (only rotatable).
:X7 DIN connection for remote control of rotation system (only rotatable).
:X8 D connection for remote control of brightness and contrast levels (not applicable).

NOTE : Above cables are integral part of cable harness 9807 750 31101.

2. DISMOUNTING AND MOUNTING OF THE CABLE HARNESS

For picture see figure 1.

- Remove the cable harness (1) from clamp (2) by pulling the harness backwards (away from the monitor housing).

- Loosen four screws (A) and remove back cover (3).

- Now, the cable harness plus strain relief clamp (4) can be loosened by lifting up clamp (4) a little.

- Clamp (4) exists of two clamp halves (B) and (C), one clamp cover (D) and a plug (F) (Not visible in picture). Those parts are attached to each other by four screws (E) M3x20.

- By removing those four screws the parts can be taken apart and in this way clamp (4) can be removed from the cable harness.

NOTE : The second hole is for looping-through possibilities, if not used the second hole must be covered with delivered plug (F).

Mounting of the cable harness takes place by carrying out the actions mentioned above in the reversed order.

IMPORTANT

- Make sure the protective sleeve of the harness does not stick into the monitor for more than 1 cm. Lengths of cables from the cable harness inside the monitor must be kept as short as possible.
  Cables must be drawn back if, e.g. during transport the sleeve has been shifted too much.

- The guiding of the cable harness (upwards as indicated in fig. 1) must be such that, independent of the position of the monitor suspension, the protective sleeve always stays at least 92 cm above the floor.

Section C: SETTING TO WORK

CONTENTS

1. GENERAL C-2

DRAWING

WM10 CZ-1

1. GENERAL

- Check and ensure all plugs are in (the right) place, and programming is accomplished according to the installation.

- Apply power, and ensure a raster is present.

- While monitoring MP11 (line out) adjust this signal with WM10:R10 to read 64.0/usec for 50Hz or 63.5/usec for 60Hz.

- Apply VIBS to WM10:X1 (Video In) and adjust for correct vertical deflection with WM10:R6.

- Brightness and contrast control are factory adjusted.
  If desired brightness and contrast default levels can be readjusted.
  Under normal light conditions: first apply image then turn brightness and contrast (front controls) counter-clockwise.
  Turn brightness up until image just becomes visible. Then turn contrast up to a desired value.

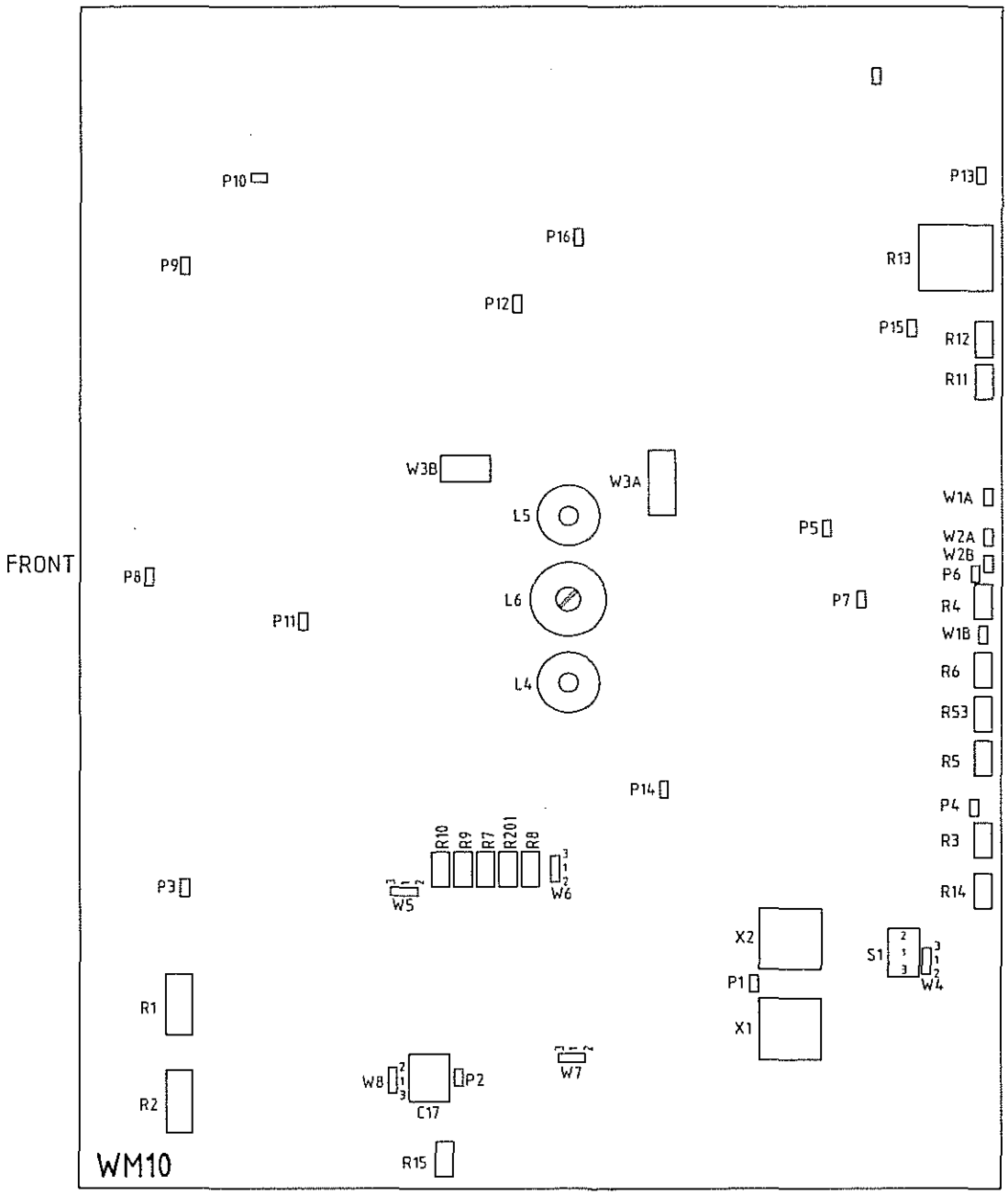
- In most cases this will be the extent of the adjustments. A list of switches, jumper settings and potentiometers with the effects of their adjustment has been included if the need for further adjustments are required.

NOTE : To adjust the monitor in accordance with Tomoscan specifications, see final section Additional Information (AI).

Overview of switches, jumpers, potentiometers, capacitors and coils with the effect of their adjustment.

Name	Position	Function
WM10:S1	1-2	Terminate WM10:X1 with 75 ohm. With WM10:W4 on 1-2, WM10:X2 is suitable for parking a second video cable. (Not in case of monitor types 9807 751 50001 and 9807 751 50101).
	1-3	Loop through (WM10:X1 = WM10:X2), WM10:X1 not terminated.
WM10:W1A		Double frame frequency
W1B		Normal frame frequency
W2A		Double frame frequency
W2B		Normal frame frequency
W3A		3:4 Scan Ratio High Line Rate
W3B		1:1
W4	1-2	Sync. internal
	1-3	external WM10:X2 (not terminated)
W5	1-2	LDR switched off
	1-3	on
W6	1-2	1:1 Scan Ratio High Line Rate
	1-3	3:4
W7	1-2	Contrast Correction standard
	1-3	low
W8	1-2	Brightness Correction on
	1-3	off
WM10:R1		Contrast Adj. (Front Panel)
R2		Brightness Adj. (Front Panel)
R3		Maximum H.T. Adj. (21kV)
R4		Vertical Linearity
R5		Vertical Shift
R6		Low Line Height Adj.
R7		High Line H.T. Adj. for 1:1 Scan Ratio
R8		Low Line H.T. Adj.
R9		Horizontal Shift
R10		Line (Hor.) Output Adj. (64.0 or 63.5 /usec)
R11		Line (Hor.) Parabola (Dynamic Focus)
R12		Vertical Parabola (Dynamic Focus)
R13		Centre Focus
R14		G1 Adjust
R15		Cathode Adjust (White Limiting)
R53		High Line Height Adj.
R201		High Line H.T. Adj. for 3:4 Scan Ratio
WM10:C17		Frequency Correction
L4		Low Line Horizontal Linearity
L5		High Line Horizontal Linearity
L6		Low Line Image Width
WM20:R1		+120 volt Adj.
WM30:		No Adjustments
WM60:		No Adjustments

COMPONENT VIEW



Section F: CORRECTIVE MAINTENANCE

CONTENTS

IMPORTANT F-2

1. GENERAL F-3

2. ADJUSTMENT PROCEDURE F-3

2.1. HIGH VOLTAGE F-4

2.2. DEFLECTION F-4

2.3. VIDEO AMPLIFIER F-6

2.4. FOCUS F-6

2.5. ADJUSTMENT OF BRIGHTNESS/CONTRAST AND CHECKING OF LDR F-6
2.5.1. Adjustment of brightness and contrast F-7
2.5.2. Checking the LDR-functioning F-7
2.5.3. Delivery F-7

2.6. FINAL EVALUATION F-7

DRAWING

WM10 FZ-1

Adjustment procedure for TV Monitor HM(R)20S

IMPORTANT

After each repair in the monitor, the adjustments mentioned in 2. and 2.1. (power supply and High Voltage) must be carried out. (legal requirement).
Fuse WM20:Z1 may only be replaced by a fuse of exactly the same type, which can be ordered under code nr. 2422 086 01042.
Since potentiometer WM10:R3 may also have to be replaced (if it has been sealed before) it can be ordered under code nr. 2122 362 00727.
Besides, in case of mounting a new deflection coil or a new monitor tube (CRT), adjustments, mentioned in 2.2. (Deflection) must also be carried out.

1. GENERAL

Check whether all plugs are in (the right) place.
Remove the fuse of the Power Supply WM20:Z1, if a resettable fuse is available; otherwise make sure to have a spare Z1-fuse.
Turn all potentiometers on basic panel WM10 in their mid-position, including R1 and R2 at the front of the monitor, except for R3, R7, R8 and R201 : turn R3, R7, R8 and R201 completely counter-clockwise.
Put jumpers (WM10) W1, W2, W3 in position B and W4, W5, W6, W7, and W8 in position 1-2.
Put switch WM10:S1 to the right (75 Ohm termination), as seen from the rear.
Disconnect WM10:X5, WM60:X5, WM60:X6 and WM60:X9.

Note: Tolerances.
When using tolerances the following should be agreed about: the number of decimals behind the full stop determines the tolerance.
So, 56 can vary between 56.0 and 56.9;
56.0 can vary between 56.00 and 56.09.

Standard factory adjustment is for low lines and an aspect ratio of 3:4 (for high lines aspect ratio: 1:1 and 3:4).

2. ADJUSTMENT PROCEDURE

Connect the monitor to the mains and switch on.
Check the voltage on power supply WM20 at point X1:1 to be 120 +/- 1 volt. IF NECESSARY, ADJUST WITH WM20:R1. Adjust the period time (WM10:R10), measured at measuring point 11 to 64.0 µsec for 50Hz or 63.5 µsec for 60Hz while no video signal is being applied to the monitor.

If available, put the resettable fuse (Z1) on the Power Supply WM20.
The following two adjustments are global; an accuracy greater than 10% is not necessary: adjust the voltage, measured at WM10:C48 as follows:
Apply a low lines video signal and adjust 35 Volts with WM10:R8.
Apply a high lines video signal with scan ratio 1:1 and adjust 60 Volts with WM10:R7 (W6 on 1-2).
Apply a high lines video signal with scan ratio 3:4 and adjust 60 Volts with WM10:R201 (W6 on 1-2).

2.1. HIGH VOLTAGE

Connect WM10:X5 to get High Voltage.

NOTE : H.T. Probe is needed for this measurement.

For low lines, turn up the High Voltage (WM10:R8) to such an extent that the circuit just starts motorboating.
Requirement: <21kV. Turn WM10:R8 a few turns back.
Repeat this procedure for high lines (1:1) with WM10:R7 and for high lines (3:4) with WM10:R201, which both finally must be turned back a few turns as well.
If WM10:R3 has been sealed, replace by a new (unsealed) potentiometer.
Mount an 820 Ohm resistor between measuring point 16 and 0V.
Replace the fuse (Z1) on the Power Supply WM20 by a resettable type or make sure to have a spare fuse.
Adjust the High Voltage to 21 kV and turn WM10:R3 clockwise until the fuse blows.
Seal WM10:R3 such, that turning becomes impossible.
Adjust the High Voltage for both line systems to 18-19 kV with WM10:R8 for low lines, WM10:R7 for high lines (1:1) and WM10:R201 for high lines (3:4).
Remove the 820 Ohm resistor.
Replace an original fuse WM20:Z1 (see "IMPORTANT" at page F-2 !).

2.2. DEFLECTION

Measure the level at the cathode of the CRT and adjust with the brightness potentiometer at 90V.
Turn WM10:R14 clockwise until the CRT just starts to lighten up.
Switch off the monitor.
Connect a separate deflection coil instead of the original one.

NOTE:

A separate deflection coil can be ordered under the code number, stated in the parts list.

Turn brightness and contrast potentiometers completely counter-clockwise.
Switch on the monitor and very carefully turn up the brightness until a little point of light becomes just visible.

WARNING!

If the brightness is turned up too high the CRT will become irreversibly damaged because of burning-in of the light point!!

Adjust, with the magnet rings of the deflection coil, the little point of light at the mechanical centre of the CRT.
Seal the magnet rings.
Connect the original deflection coil.
For the following adjustments a cross-hatch pattern must be displayed.
First adjust the High Voltage for high lines (1:1); adjust with WM10:R7.
Demand: between 18 and 19.2 kV.
Adjust the High Voltage for high lines (3:4); adjust with WM10:R201, 300 volts higher than the High Voltage for high lines (1:1).
Switch over to low lines.
Adjust the High Voltage 300 volts higher than the value at high lines (1:1) or equal to the value at high lines (3:4); adjust with WM10:R8 (max. 19.5 kV).
Now adjust the images as stated hereafter:

- Adjust WM10:R9 such, that the trailing edge of the (line) sync. pulse (MP3) coincides with the middle of the line deflection flyback (MP13:H-drive).
- High lines (1:1) : WM10:W3 on B and WM10:W6 on 1-2.
  High lines (3:4) : WM10:W3 on A and WM10:W6 on 1-3.
- Image width with WM10:R8 (low lines), WM10:R7 (high lines 1:1) and WM10:R201 (high lines 3:4).
- Line linearity: WM10:L4 (low lines) and WM10:L5 (high lines).
- Image height: WM10:R6 (low lines) and WM10:R53 (high lines).
- Vertical linearity: WM10:R4.
- Vertical shift: WM10:R5.
- Horizontal shift can be corrected with WM10:R9.

Notes:

- For low lines, the image width can also be influenced by WM10:L6.
- The adjustments for high and low have influence upon each other. Therefore, first adjust the monitor globally and then repeat adjustments until the requirements are met.
- Equality of the High Voltage (or 300V difference in case of 1:1) is more important than the exact equality of the deflection.
- The image geometry can also be influenced by the round magnets, delivered with the deflection coil.

Connect WM60:X5, WM60:X6 and WM60:X9.

2.3. VIDEO AMPLIFIER

Turn the brightness potentiometer completely clockwise and the contrast potentiometer completely counter-clockwise.
Adjust with WM10:R14 the light output to 25 cd/m^2. (Recommended measuring device: Gossen Lunasix F).
Apply a step function with a rise time of at least 30 nsec.
With the contrast potentiometer adjust the cathode signal at 25V peak-to-peak.
Adjust the signal with WM10:C17 for minimal overshoot.
Apply a sawtooth signal.
Turn the contrast potentiometer to maximum and adjust the white limiting with WM10:R15 at 50V (measured at the cathode).
Apply a white image low lines video signal.
Adjust WM10:R15 to get a light output at the centre of the image of 400 cd/m^2.

2.4. FOCUS

Measure the signal at the heat sink of WM10:V49.
Adjust the line parabola at 250V (WM10:R11); the frame parabola at 100V (WM10:R12).
Adjust for optimal definition in the centre of the image with WM10:R13.

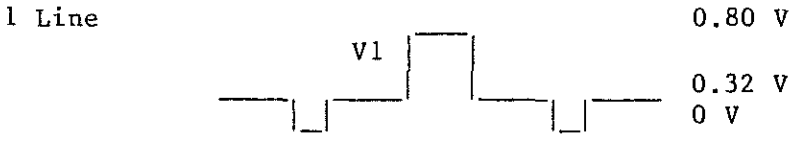
2.5. ADJUSTMENT OF BRIGHTNESS/CONTRAST AND CHECKING OF LDR

Monitor light output must have stabilized (at least 1/2 hour after switch-on).

Connect the remote control for brightness and contrast.
Also connect flat cable WM10:X9.
Brightness and contrast must be in default position.
Default position can be achieved by pressing up- and down button simultaneously.

Jumper settings WM10: W1:B, W2:B, W3:B, W4:1-2, W5:1-2, W6:1-2, W7:1-3, W8:1-3.
Switch: WM10:S1 to 1-2.

Video input at WM10:X1 :
Image, containing a flat white area (e.g. a vertical bar); non-HR; 3:4.
Level difference at WM10:X1 between white- and black level must be adjusted according to figure.



V1= 0.48 ± 0.005 V

Measure the brightness of the white area with the help of a Lux meter.

2.5.1. Adjustment of brightness and contrast

Brightness and Contrast at 0 by turning WM10:R2 and WM10:R1 completely counter-clockwise.
Lux meter at: < 1 cd/m^2.
Turn up Contrast (WM10:R1) to 17 cd/m^2.
Turn up Brightness (WM10:R2) to 114 cd/m^2.
Now both potentiometers are in their position-of-delivery.

2.5.2. Checking the LDR-functioning

WM10:W5 in position 1-3.
Excessive light on LDR (Lux meter: 113-114 cd/m^2).
Rough check of LDR.
Measure minimal light output by disconnecting the LDR (disconnect WM10:X10).
Lux meter 45 $\pm$5 cd/m^2.
Reconnect LDR and block it out as lighttight as possible. Lux meter: minimum output; 2 to 3 cd/m^2.
Check the LDR characteristic by illuminating it such, that a correct LDR causes a screen light output of 60 $\pm$15 cd/m^2.

2.5.3. Delivery

Metal strip between WM:1 and WM:2 must be taken away and parked at WM:1.
Shove basic panel back.
In case of fixed version; put covers in potentiometer holes.

2.6. FINAL EVALUATION

Check the image critically for imperfections like:

(a) Extreme noise
(b) A tendency to oscillation
(c) Stripes

Also check for scratches or dirt on the monitor.

Overview of switches, jumpers, potentiometers, capacitors and coils with the effect of their adjustment.

Name	Position	Function
WM10:S1	1-2	Terminate WM10:X1 with 75 ohm. With WM10:W4 on 1-2, WM10:X2 is suitable for parking a second video cable. (Not in case of monitor types 9807 751 50001 and 9807 751 50101).
	1-3	Loop through (WM10:X1 = WM10:X2), WM10:X1 not terminated.
WM10:W1A		Double frame frequency
W1B		Frame frequency
W2A		Double frame frequency
W2B		Frame frequency
W3A		3:4 Scan Ratio High Line Rate
W3B		1:1
W4	1-2	Sync. internal
	1-3	external WM10:X2 (not terminated)
W5	1-2	LDR switched off
	1-3	on
W6	1-2	1:1 Scan Ratio High Line Rate
	1-3	3:4
W7	1-2	Contrast Correction standard
	1-3	low
W8	1-2	Brightness Correction on
	1-3	off
WM10:R1		Contrast Adj. (Front Panel)
R2		Brightness Adj. (Front Panel)
R3		Maximum H.T. Adj. (21kV)
R4		Vertical Linearity
R5		Vertical Shift
R6		Low Line Height Adj.
R7		High Line H.T. Adj. for 1:1 Scan Ratio
R8		Low Line H.T. Adj.
R9		Horizontal Shift
R10		Line (Hor.) Output Adj. (64.0 or 63.5 /usec)
R11		Line (Hor.) Parabola (Dynamic Focus)
R12		Vertical Parabola (Dynamic Focus)
R13		Centre Focus
R14		G1 Adjust
R15		Cathode Adjust (White Limiting)
R53		High Line Height Adj.
R201		High Line H.T. Adj. for 3:4 Scan Ratio
WM10:C17		Frequency Correction
L4		Low Line Horizontal Linearity
L5		High Line Horizontal Linearity
L6		Low Line Image width
WM20:R1		+120 volt Adj.
WM30:		No Adjustments
WM60:		No Adjustments

Note 1:

Adjustments for a rotatable and a non-rotatable monitor are in principle the same.
Only, in case of a rotatable monitor, check the following:
When switching-on the monitor the deflection coil must automatically turn to its zero position.
Check left- and right turning of the deflection coil, both in local- and remote control.
Check (with a circle signal) whether the swinging of the circle during rotation remains within 1% of the image height.

Note 2:

The adjustment procedure as described in this section C is valid for both 50 Hz and 60 Hz mains frequency applications, only:
- for low line rate one should read 625 lines for 50 Hz or 525 lines for 60 Hz.
- for high line rate one should read 1249 lines for 50 Hz or 1049 lines for 60 Hz.
- as final adjustment, adjust the Vertical Deflection with R6 on WM10.

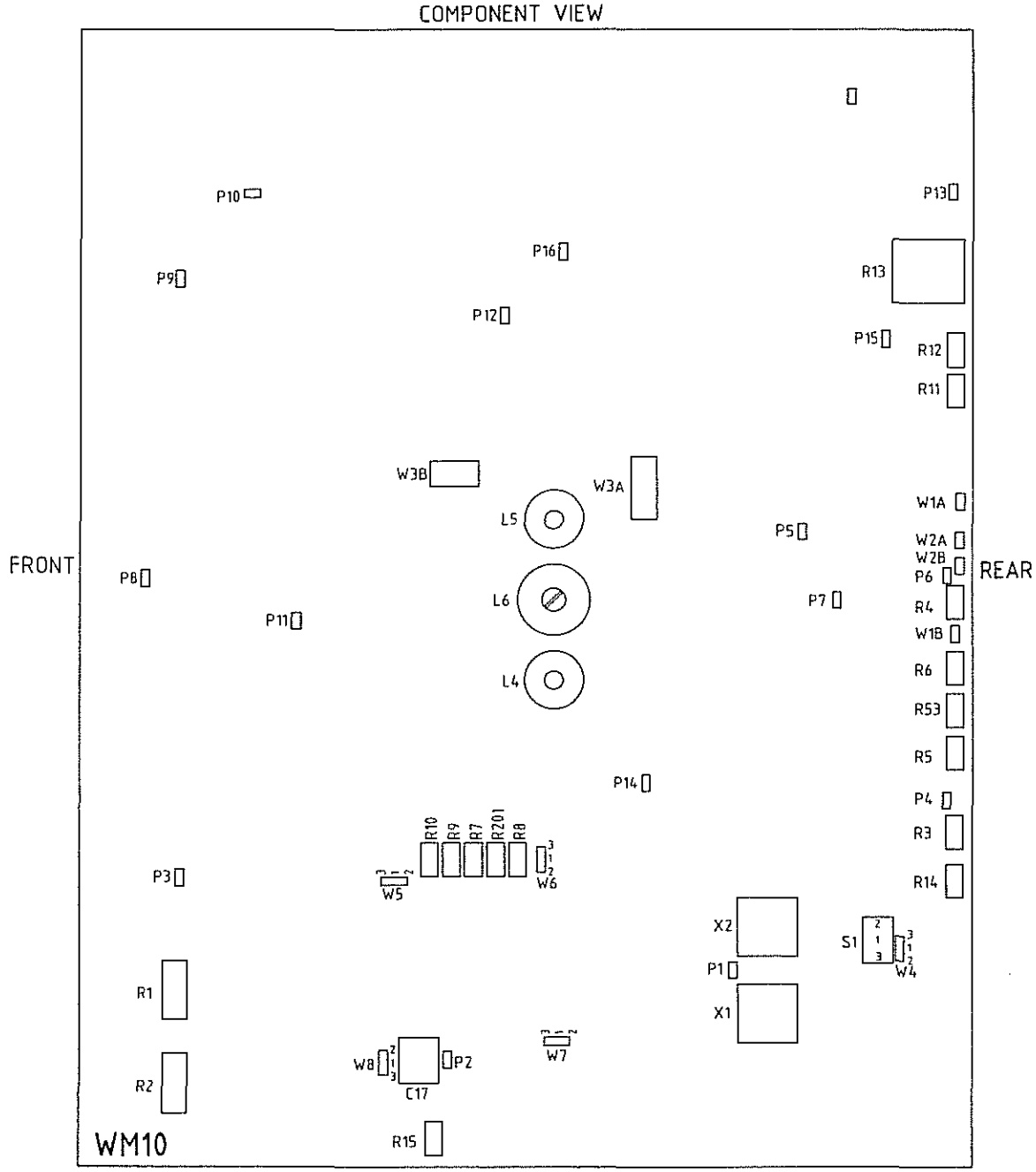
Note 3:

Specific Adjustment for DCI
For DCI-application, only the Vertical Amplitude must be readjusted (WM10:R6)
For specific values, see Documentation "DCI Combined Unit Manual", Section C.

Note 4:

If the image width is too small or too large, the whole image can be enlarged narrowed by lowering or increasing the high voltage by adjusting the applicable potentiometer.

COMPONENT VIEW



PHILIPS

parts list

SERVICE PARTSLIST UNIT

PEI: 9807 751 51401

DESCRIPTION: HMR20S 20"ROT. TV MONITOR 50Hz.

SERIAL NR: 1654220 -367

List of pages and drawings

P-00 (89-2)

P-1 (89-2)

P-2 (89-2)

*printing instructions 4522 983 30401

SCHEME/ PAGE	INDEX	CODENUMBER	DESCRIPTION	DATA
005	WM 10	4522 108 09855	BASIC 20"MON.HR PCB	
010	WM 20	4522 107 87853	POWER SUPPLY 20"MON.HR PCB	
015	WM 30	4522 107 87805	TUBE SOCKET 20"MON.HR PCB	
020	WM 40	4522 108 01301	CONTACT PANEL 20" MON.	
025	WM 60	4522 108 10002	ROTATION CONTROL 20"MON.	
030	F1/F4	2422 086 01042	UL-FUSE T MDL	1A,250V.
035	M1	4522 104 10302	MOTOR RSM50/8FDG	220V.
040	S1	4522 103 88632	SWITCH	
045	S1-La	2412 533 00418	BULB	19V.40mA
050	S2	4522 103 88641	SWITCH	
055	T1	3112 328 32322	MAINS TRANSFORMER	
060	T2	3322 603 00303	DEFLECTION COIL AT1039/09S	
065	V1	9301 229 40142	TV TUBE M47 EAA27WW	
070	WM 50-S1	2422 120 00141	MICROSWITCH VCSP-UL 3N3	
075	WM 50-S1r	2422 135 00013	ROLLER for MICROSWITCH	
080	X1	2422 015 13127	PLUG LCBS-3R	5.4MM
085	Z1	2432 527 00018	MAINS FILTER FN322-1/05	
090		4522 161 57205	FRONT PLATE	
095		4522 161 57224	COVER	

SCHEME/ PAGE	INDEX	CODENUMBER	DESCRIPTION	DATA
100		4522 161 57244	REAR PANEL	
105		4522 161 58082	FOOT	
110		4522 161 59304	TEXT PLATE	
115		4522 161 64541	TOOTHWHEEL	
120		4522 161 64561	TOOTHWHEEL PLATE	
125		4522 103 87011	KNOB MR 16-6	

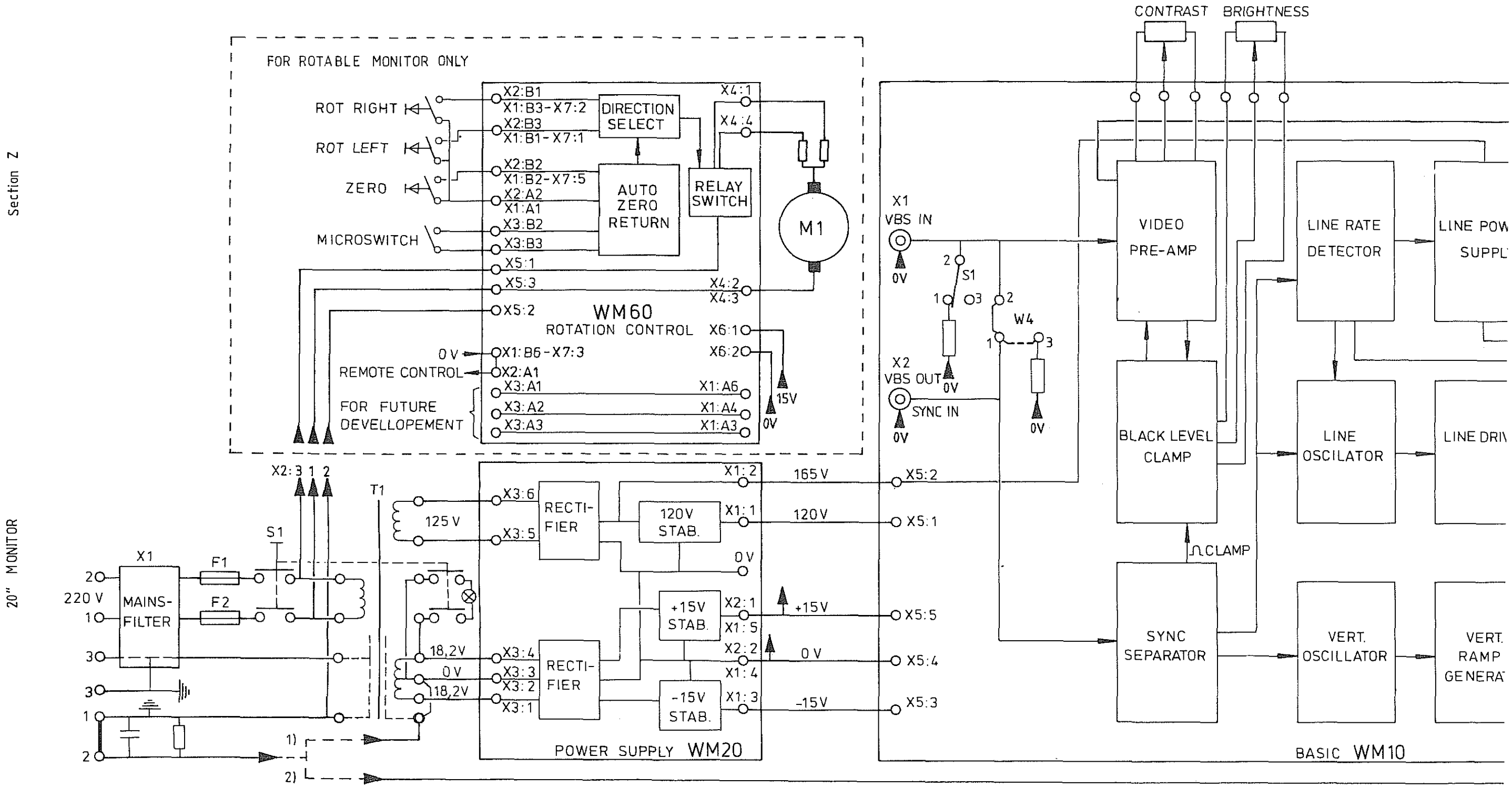
Section Z: DRAWINGS

CONTENTS

Block diagram of 20" HR-Monitor		Z1-0
Wiring diagram of 20" HR-Monitor		Z2-1
Cable harness		Z2-2
Wiring diagram of 20" Rotatable Monitor		Z2-3
Basic board	WM10	Z3-1
Power supply	WM20	Z3-2
Tube socket	WM30	Z3-3
Rotation control	WM60	Z3-4

Section Z

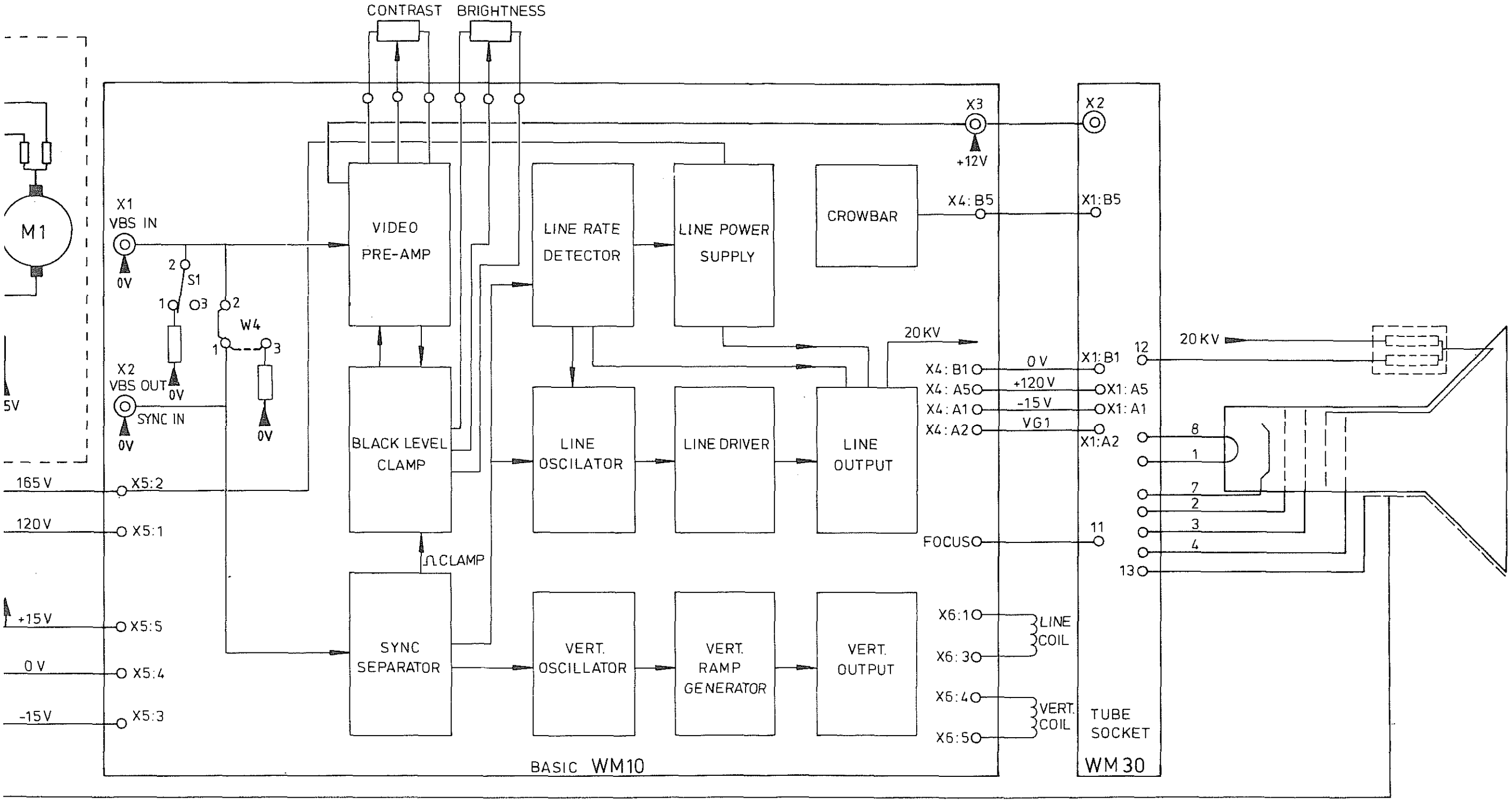
20" MONITOR



NOTE :

1) FOR ROTABLE MONITOR ONLY

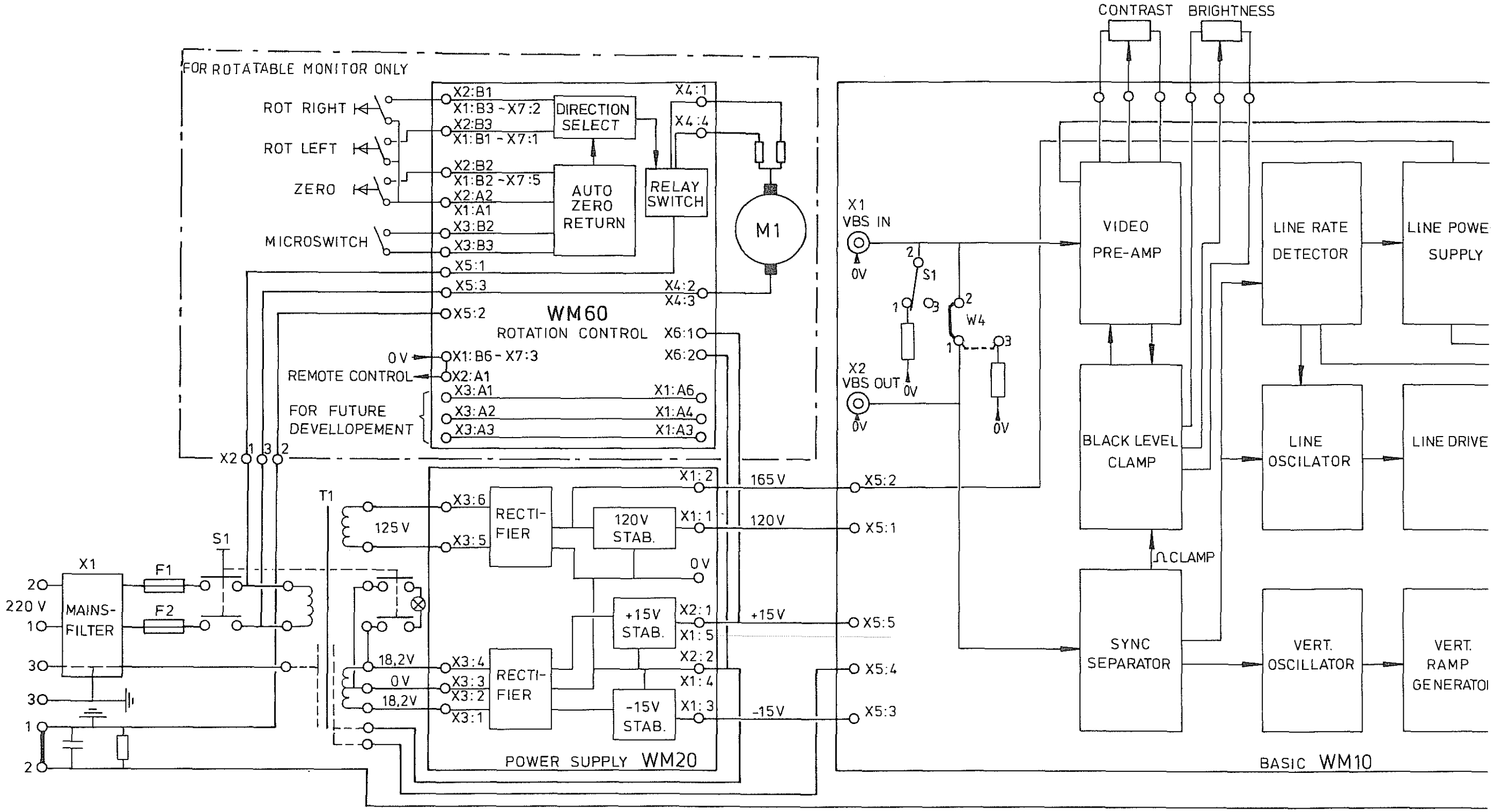
2 FOR NON ROTABLE MONITOR ONLY

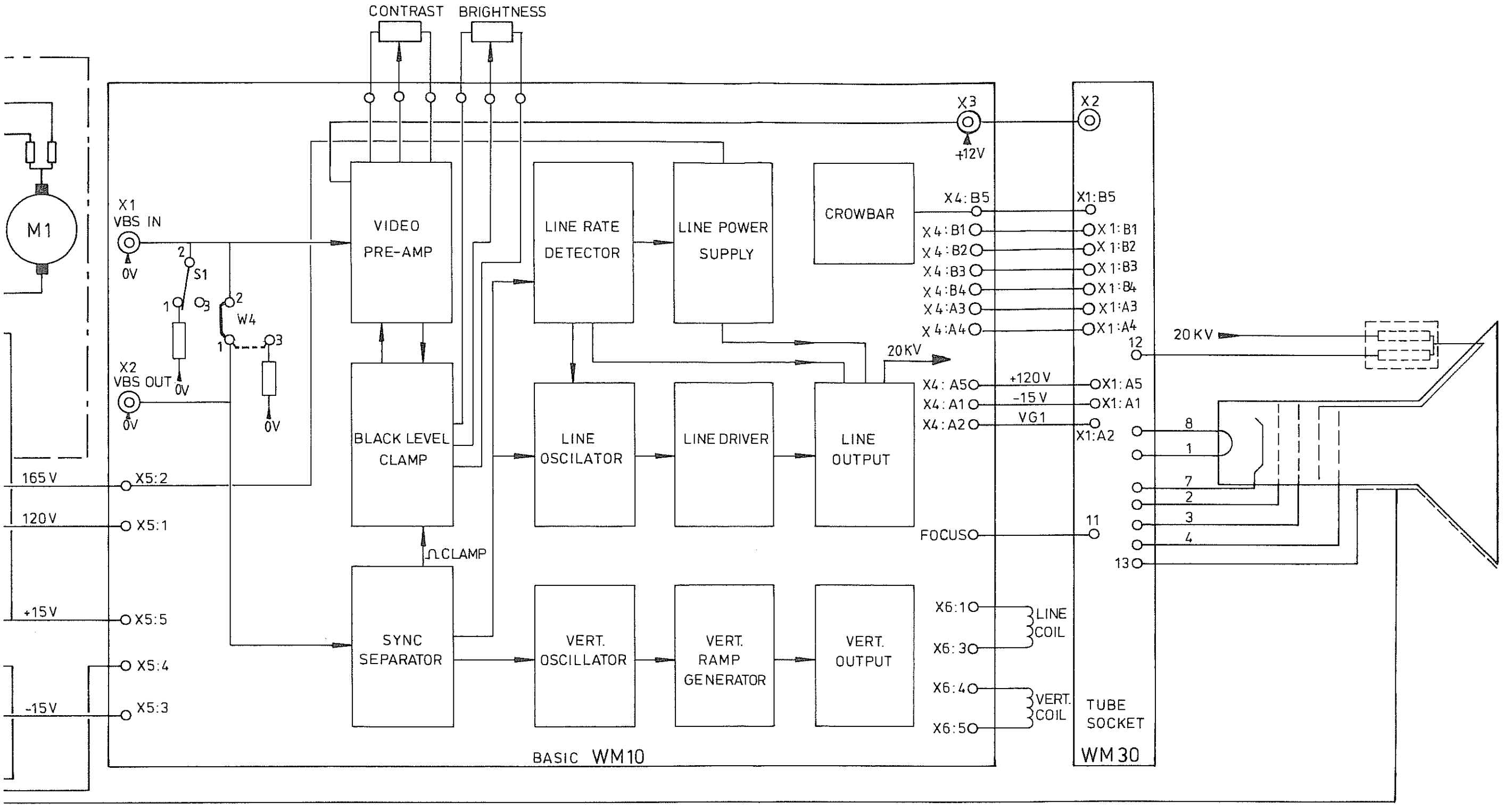


BLOCK DIAGRAM
OF 20" HR MONITOR

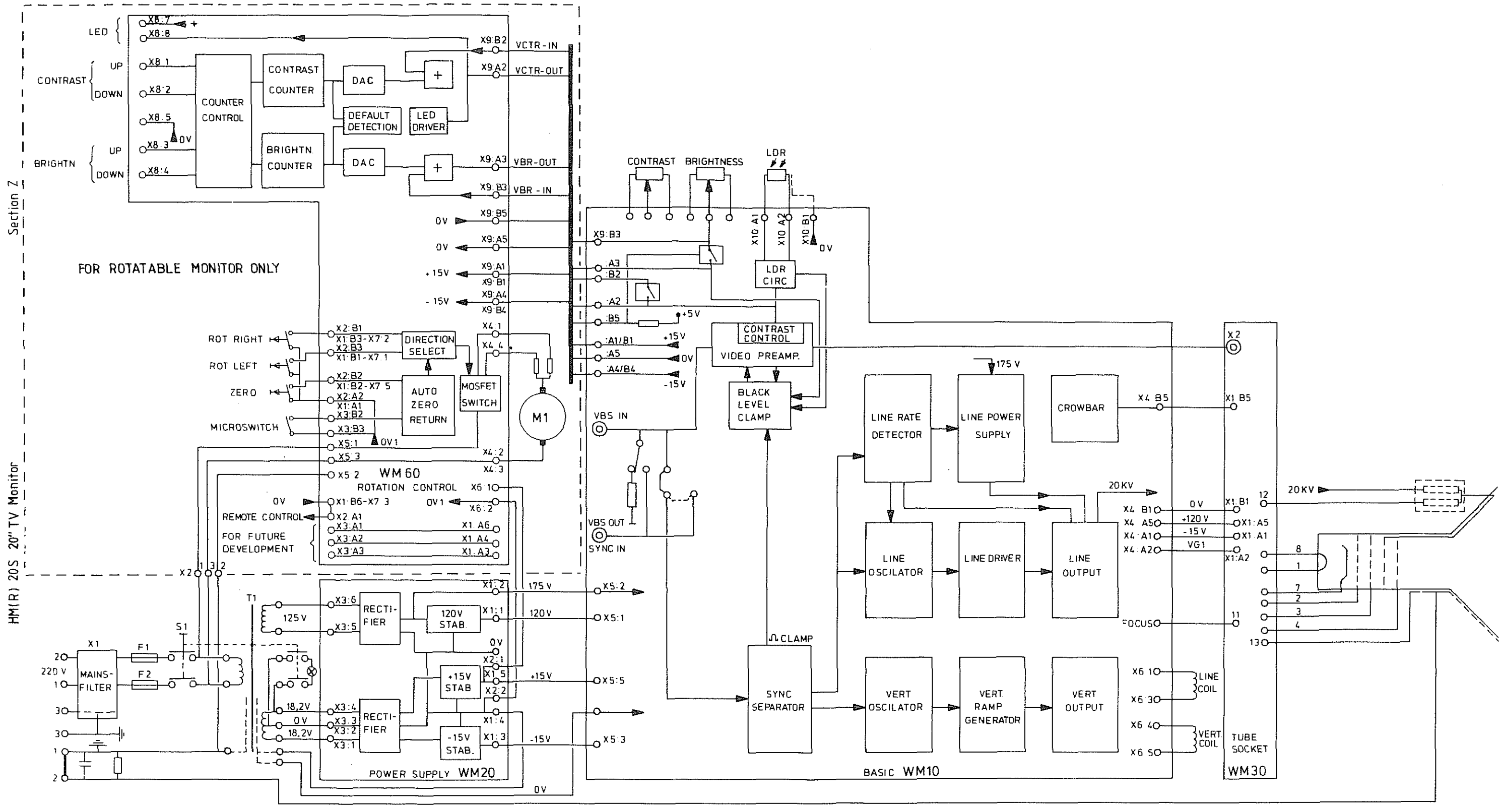
Section Z

20" MONITOR





BLOCK DIAGRAM
OF 20" HR MONITOR



BLOCK DIAGRAM
20" MONITOR

WM

WM60 ROTATION CONTROL

FOR ROTABLE MONITOR ONLY

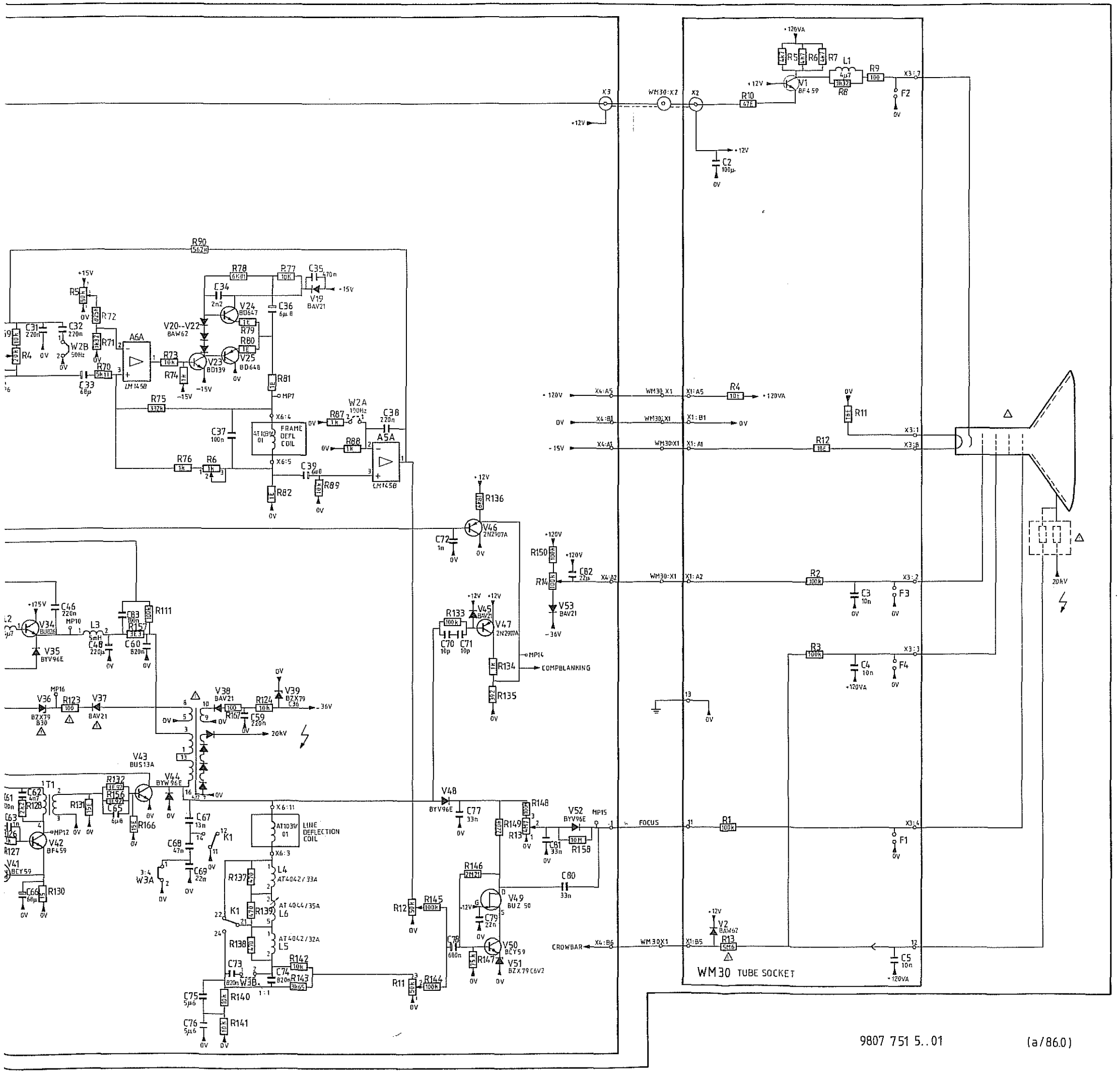
WM20 POWER SUPPLY

WM10 BASIC

20" HR MONITOR

Section Z

WM10 BASIC

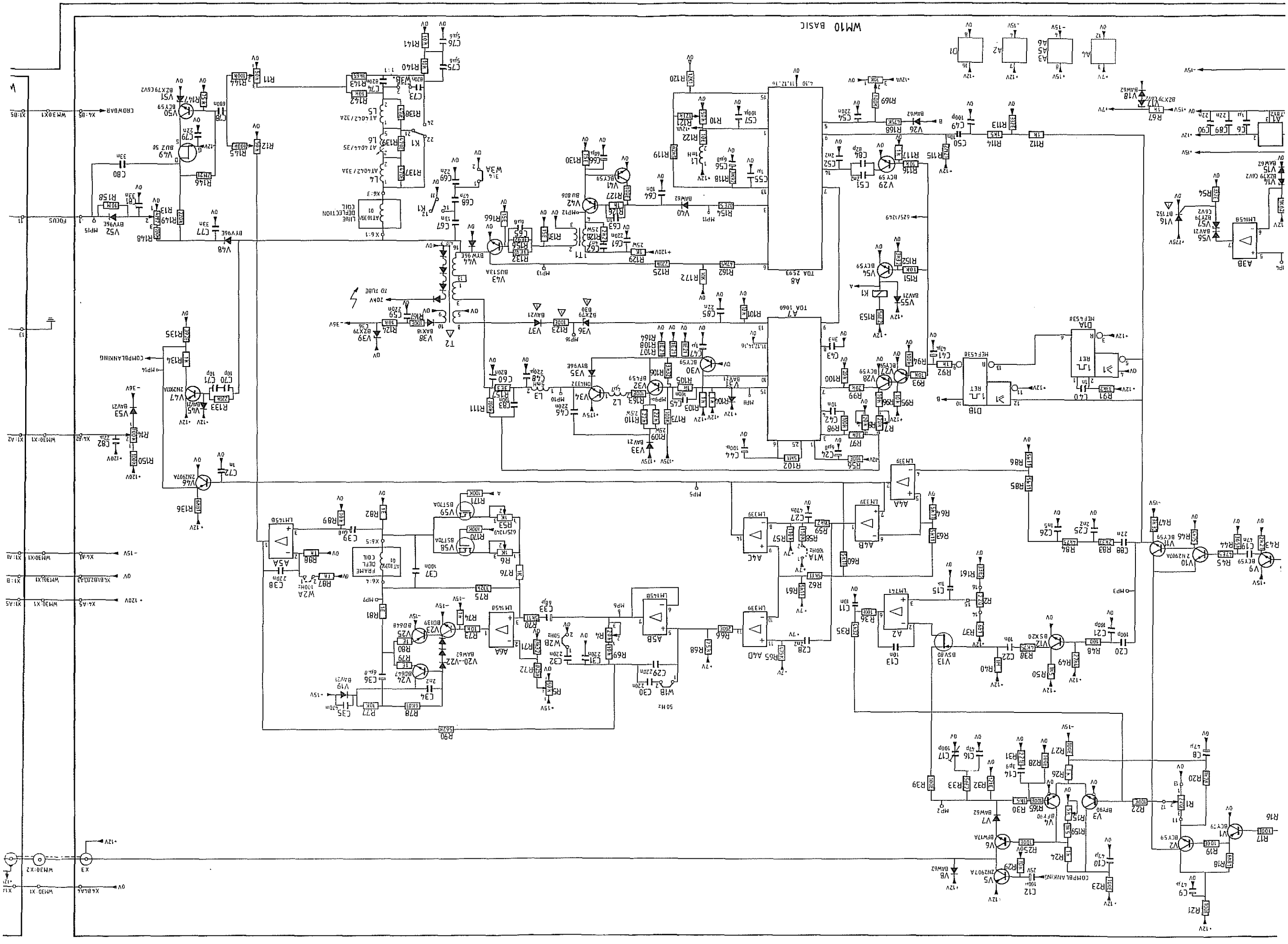

WM30 TUBE SOCKET
DIAGRAM OF
20 " MONITOR - HR
9807 751 5..01
(a/86.0)
Z1-

WM60 ROTATION CONTROL

FOR ROTATABLE MONITOR ONLY

WM20 POWER SUPPLY

WM10 BASIC


WM10 BASIC
A3B
TDA 2593
TDA 1060
D1A
D1B
HEF4538
LM1458
LM339
LM741
BCY59
BC639
BC640
BSV80
BSX20
BAW62
BAV21
BZX79B30
BZX79C6V2
BZX79C12
BZX79C15
BZX79C18
BZX79C27
BZX79C33
BZX79C36
BZX79C39
BZX79C47
BZX79C56
BZX79C68
BZX79C82
BZX79C100
BZX79C120
BZX79C150
BZX79C180
BZX79C220
BZX79C270
BZX79C330
BZX79C390
BZX79C470
BZX79C560
BZX79C680
BZX79C820
BZX79C1K0
BZX79C1K2
BZX79C1K5
BZX79C1K8
BZX79C2K2
BZX79C2K7
BZX79C3K3
BZX79C3K9
BZX79C4K7
BZX79C5K6
BZX79C6K8
BZX79C8K2
BZX79C10K
BZX79C12K
BZX79C15K
BZX79C18K
BZX79C22K
BZX79C27K
BZX79C33K
BZX79C39K
BZX79C47K
BZX79C56K
BZX79C68K
BZX79C82K
BZX79C100K
BZX79C120K
BZX79C150K
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BZX79C1M0
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BZX79C18M
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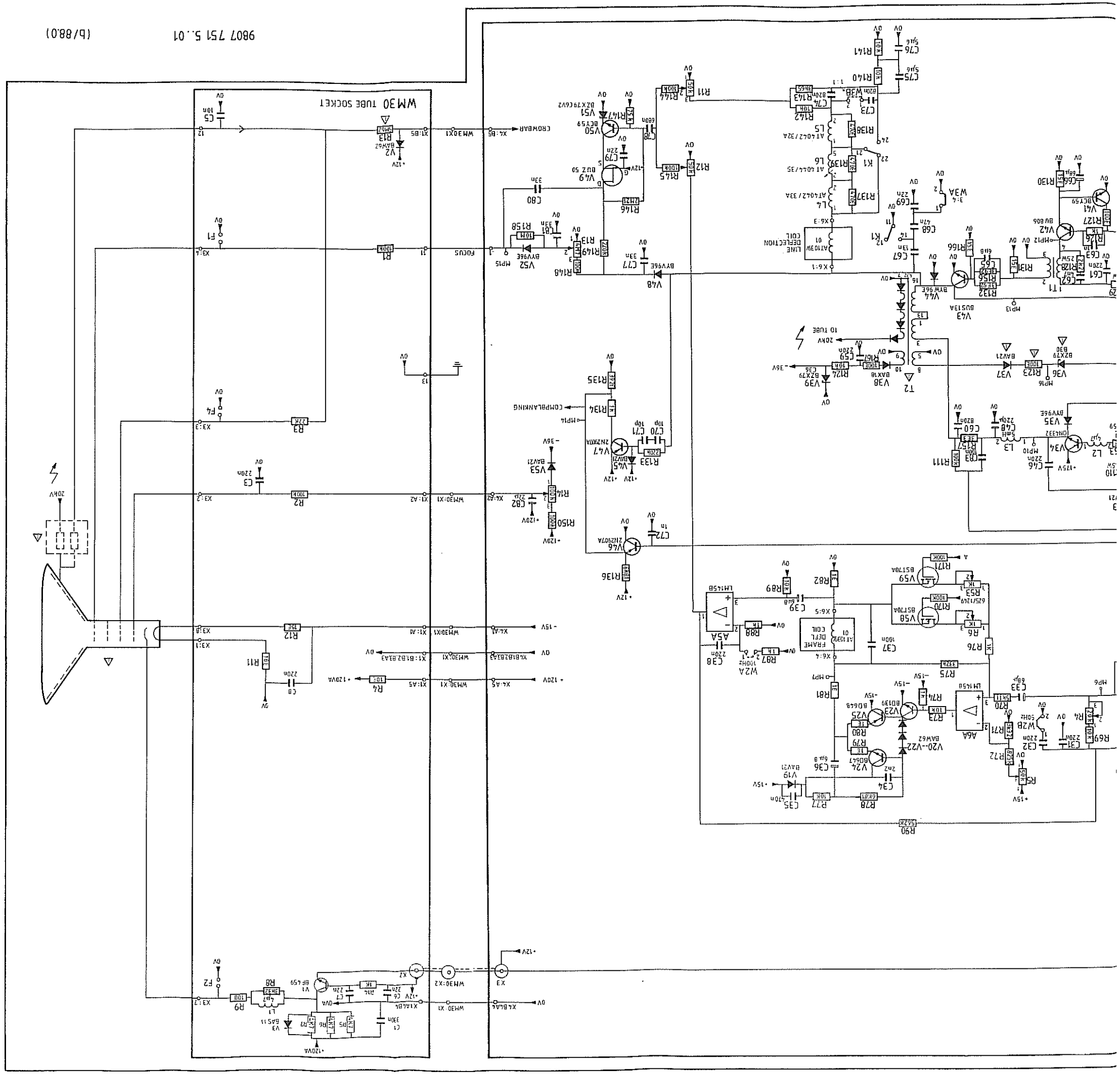
BZX79C39M
BZX79C47M
BZX79C56M
BZX79C68M
BZX79C82M
BZX79C100M
BZX79C120M
BZX79C150M
BZX79C180M
BZX79C220M
BZX79C270M
BZX79C330M
BZX79C390M
BZX79C470M
BZX79C560M
BZX79C680M
BZX79C820M

DIAGRAM OF
20 " MONITOR - HR


WM30 TUBE SOCKET
WM30-X1
WM30:X2
X1
X2
X3
X4
X6
F1
F2
F3
F4
R1
R2
R3
R4
R5
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C81
C82
V1
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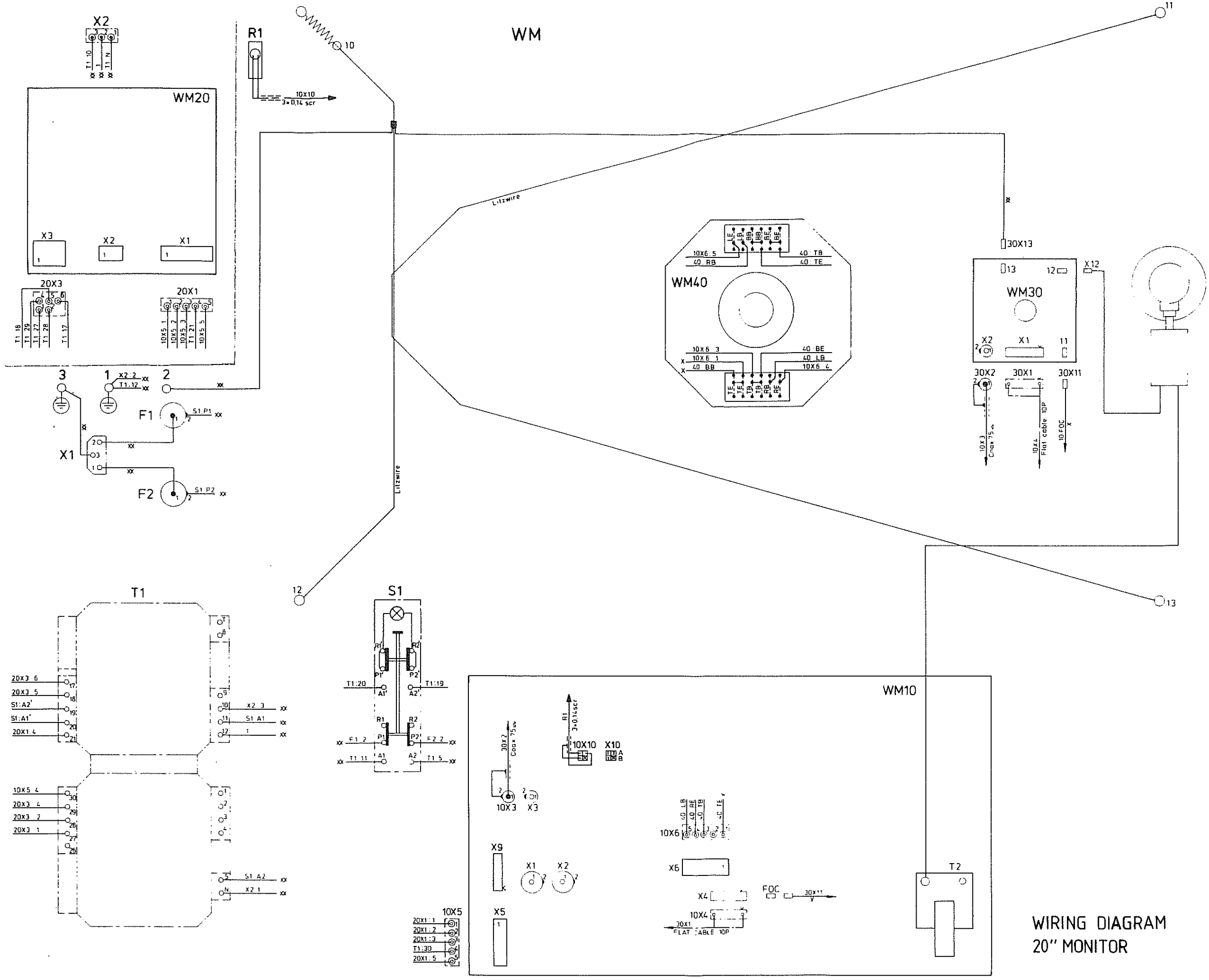
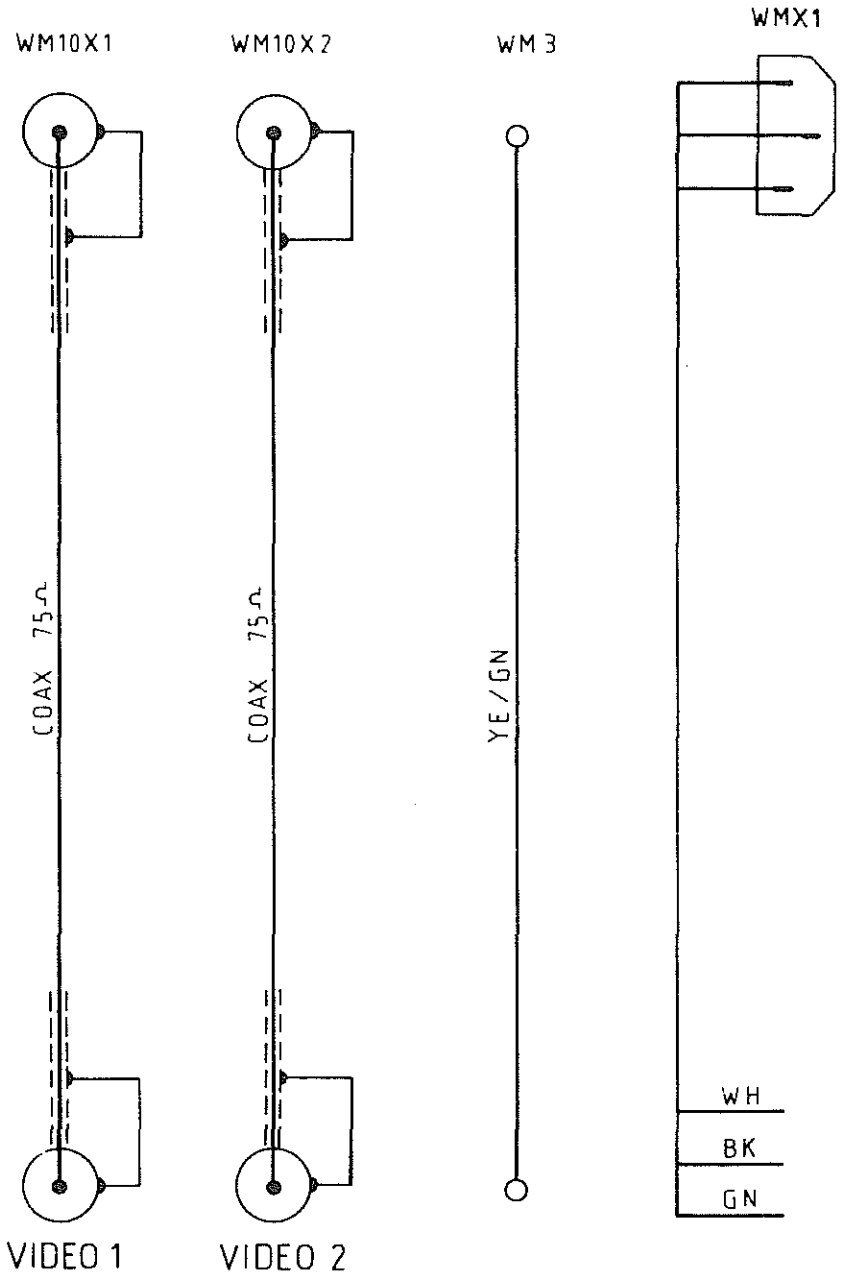
V38
V39
V40

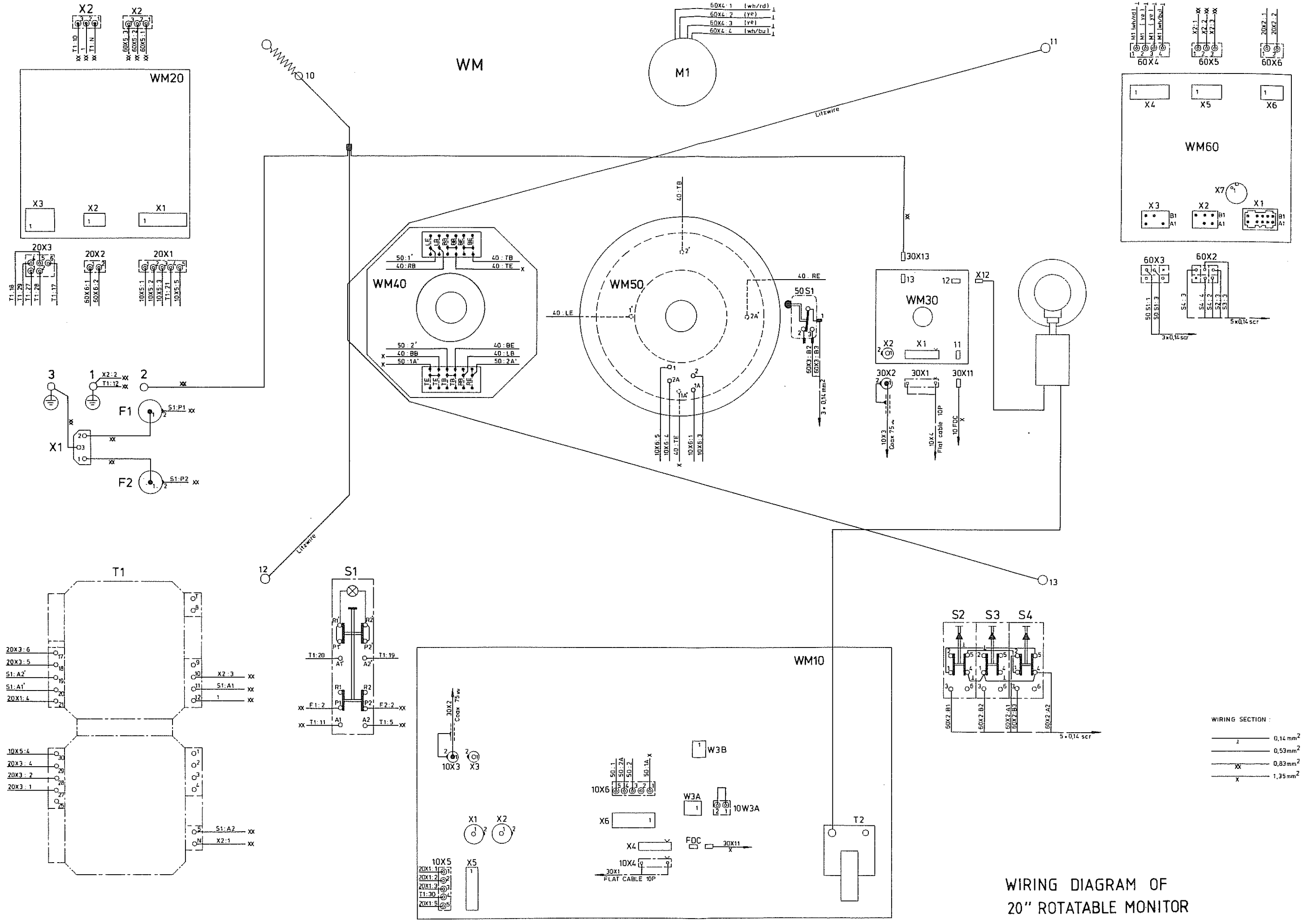
Section Z



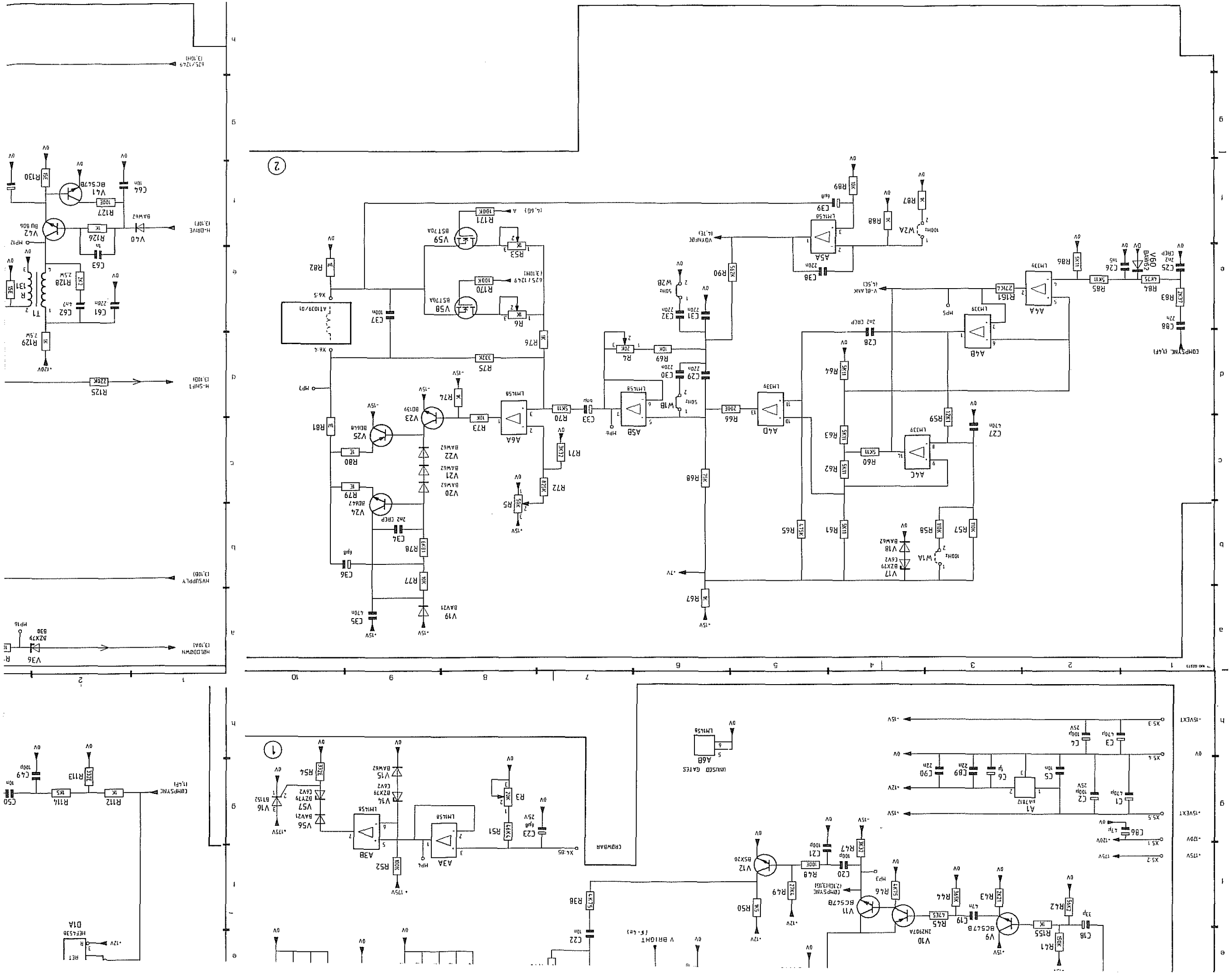
WIRING DIAGRAM
20" MONITOR

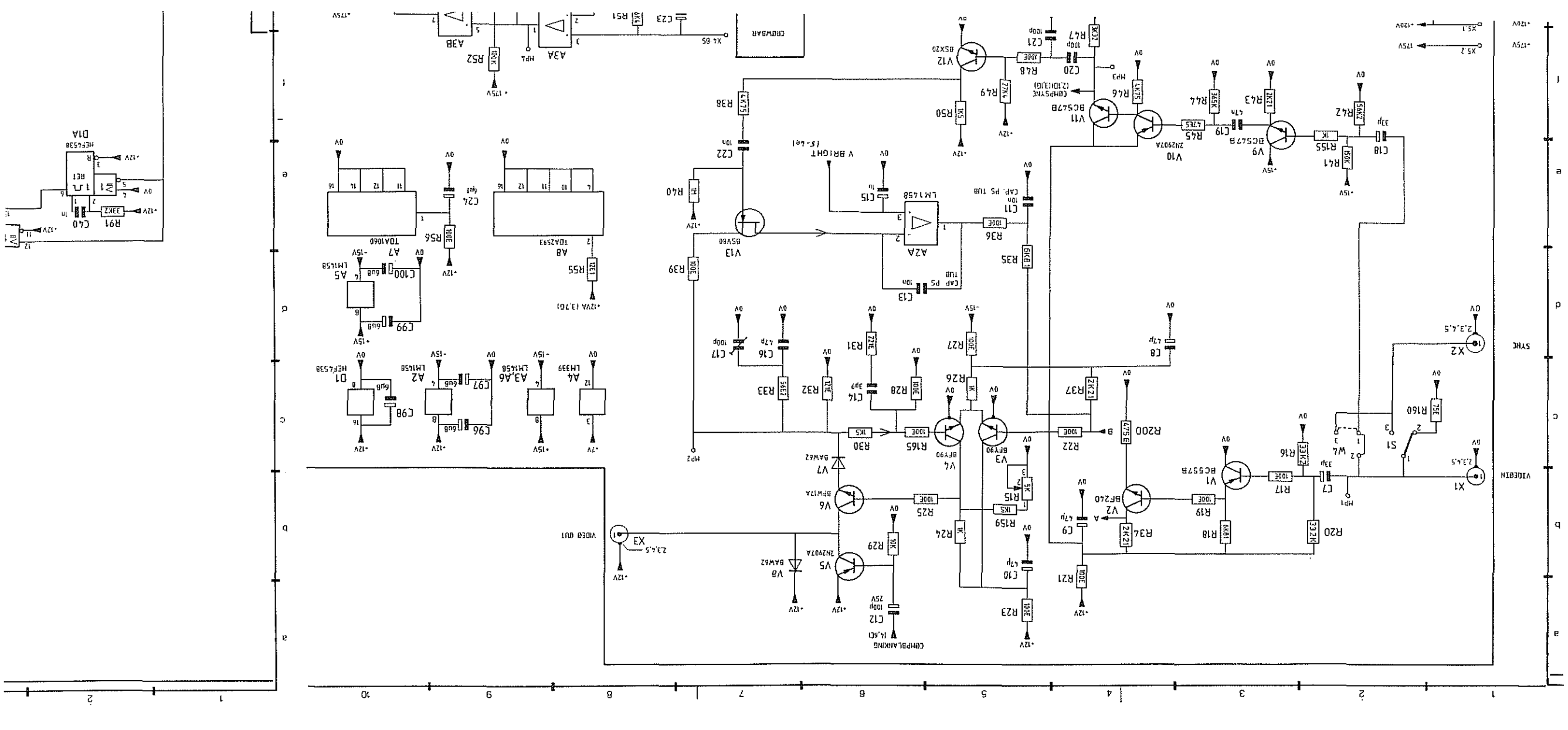


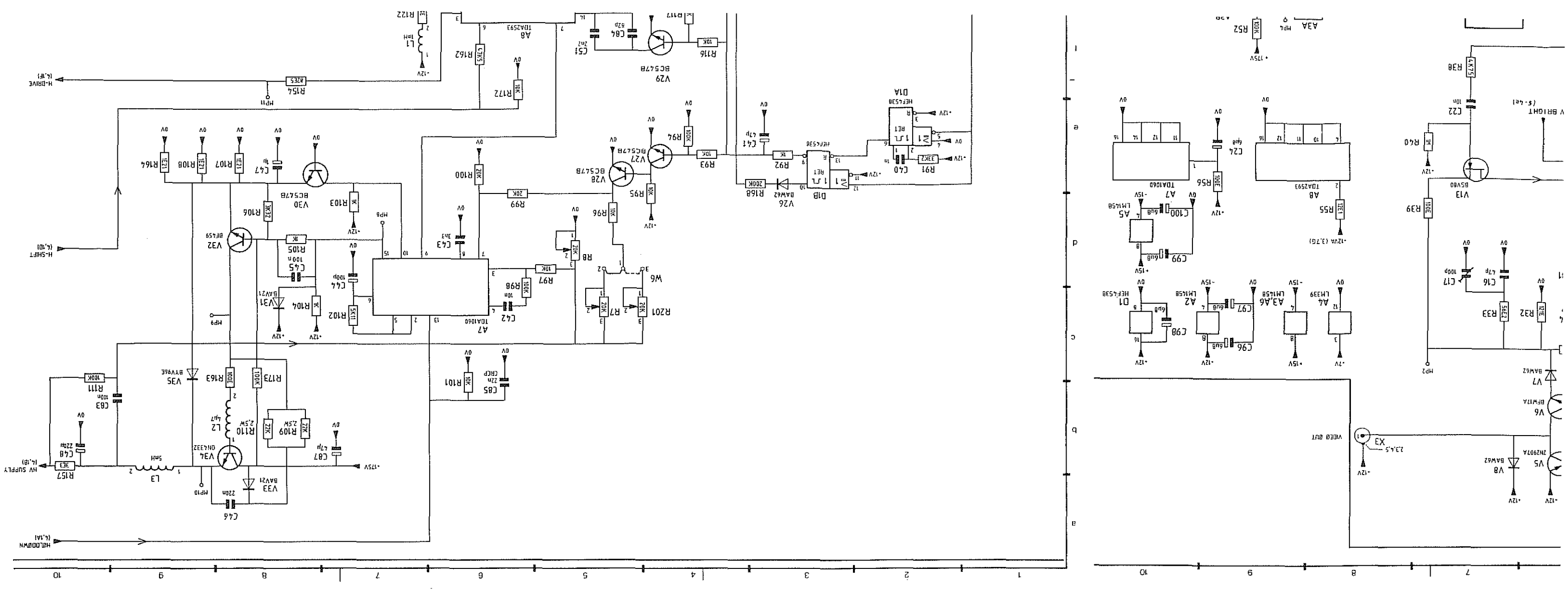
CABLE HARNESS



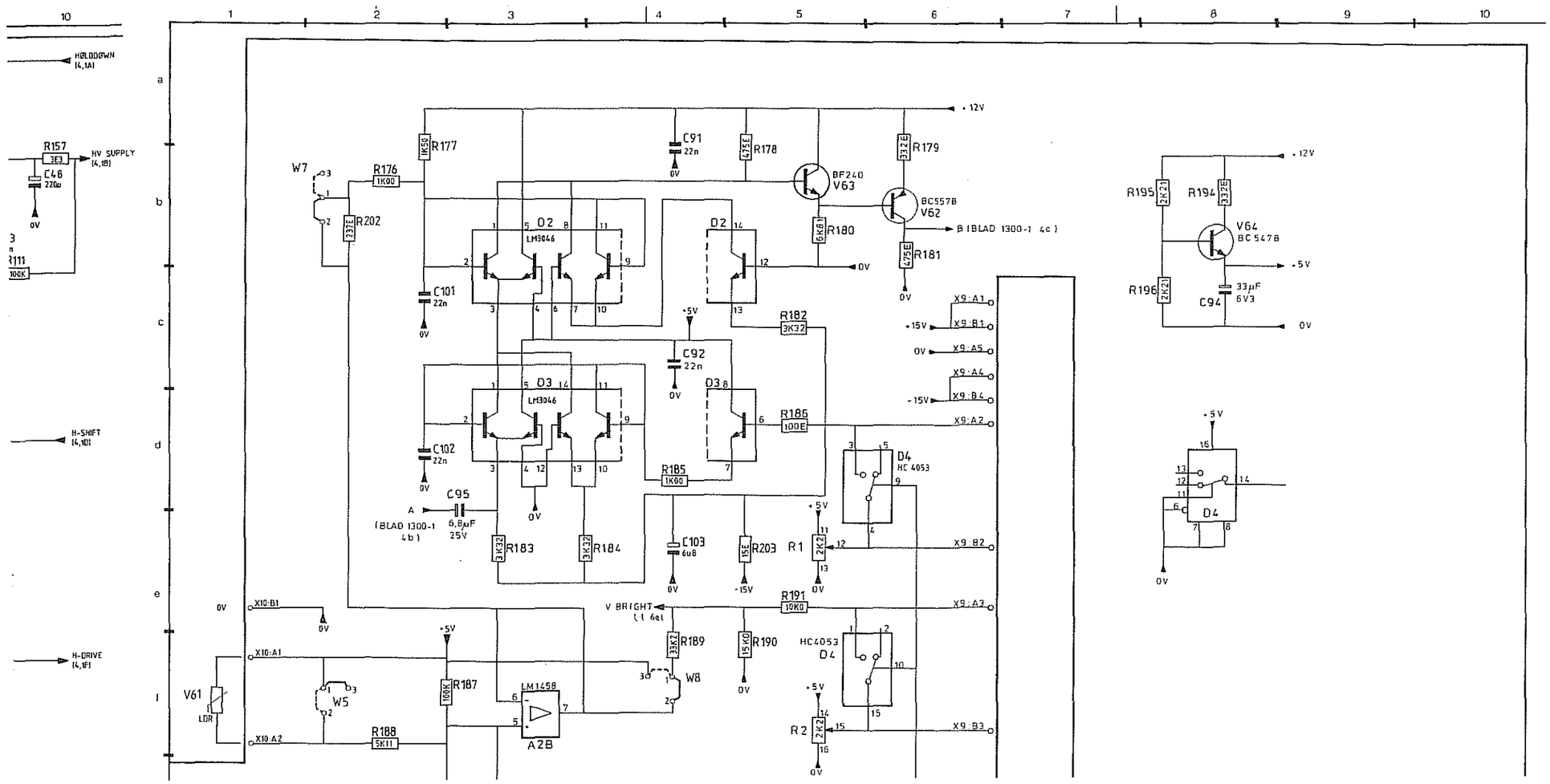
WIRING DIAGRAM OF 20" ROTATABLE MONITOR

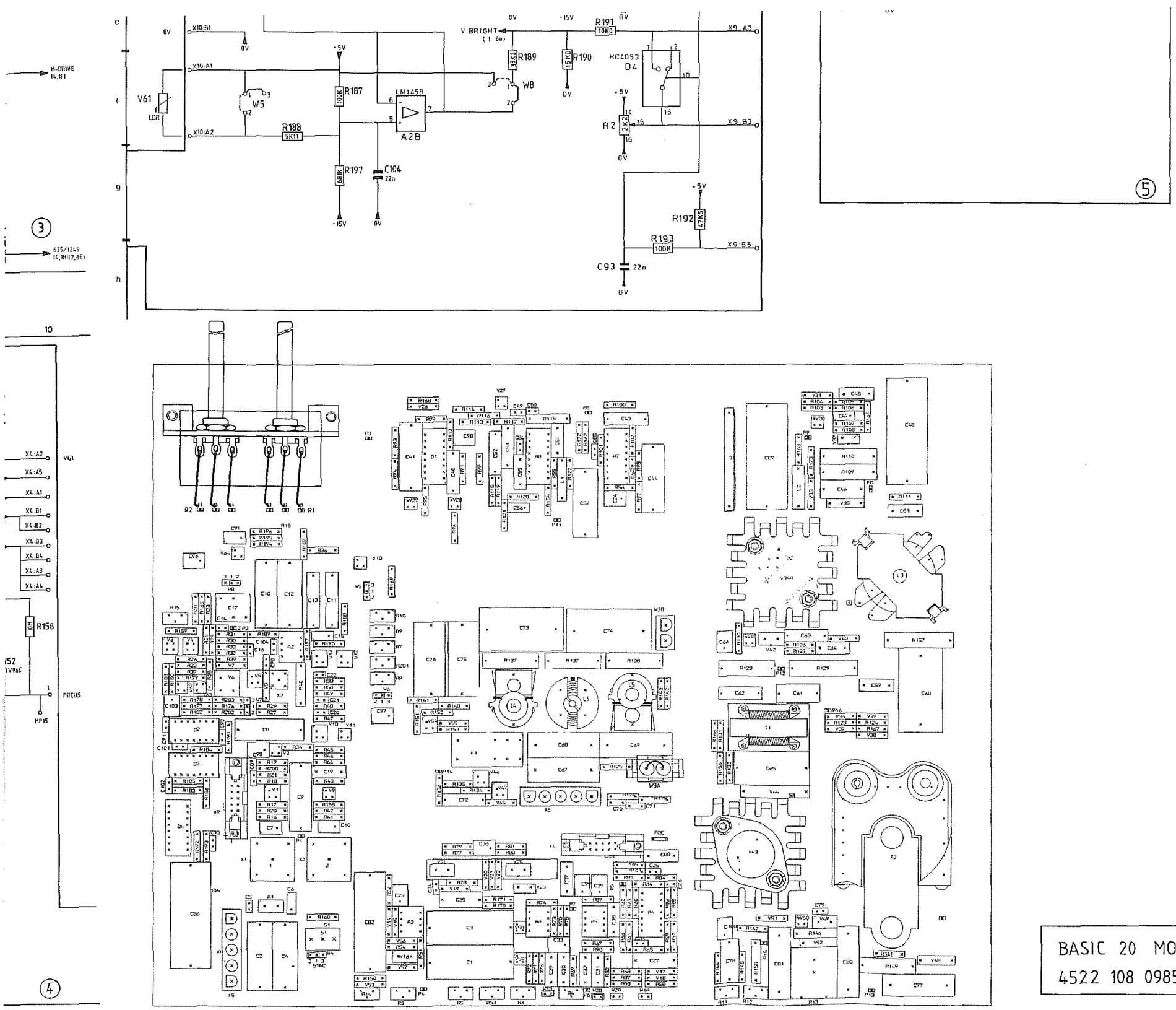

(2)
(1)
COMPSYNC (1,4F)
V-BLANK (1,5C)
VOYNFOC (1,7E)
HPS
HPA
HPB
HP1
HP2
HP3
HP12
HP16
CROWBAR
V BRIGHT (5-12)
COMPSYNC (2,10)(3,5G)
A1 LM7812
A2 LM7912
A3A LM1458
A3B LM1458
A4A LM339
A4B LM339
A4C LM339
A4D LM339
A5A LM1458
A5B LM1458
A6A LM1458
A6B LM1458
V1A BZX79 C6V2
V1B BZX79 C6V2
V2 BU806
V3 BU806
V4 BC547B
V5 BC547B
V6 BC547B
V7 BC547B
V8 BC547B
V9 BC547B
V10 2N2907A
V11 BC547B
V12 BSX20
V13 BD139
V14 BZX79 C6V2
V15 BAW62
V16 BZX79 C6V2
V17 BZX79 C6V2
V18 BAW62
V19 BAY21
V20 BAW62
V21 BAW62
V22 BAW62
V23 BD139
V24 BD647
V25 BD646
V26 BAW62
V27 BAW62
V28 BAW62
V29 BAW62
V30 BAW62
V31 BAW62
V32 BAW62
V33 BAW62
V34 BAW62
V35 BAW62
V36 BZX79 B3V6
V40 BU806
V41 BC547B
V42 BU806
T1
R1 10K
R2 10K
R3 10K
R4 10K
R5 50K
R6 10K
R7 10K
R8 10K
R9 10K
R10 10K
R11 10K
R12 10K
R13 10K
R14 10K
R15 10K
R16 10K
R17 10K
R18 10K
R19 10K
R20 10K
R21 10K
R22 10K
R23 10K
R24 10K
R25 10K

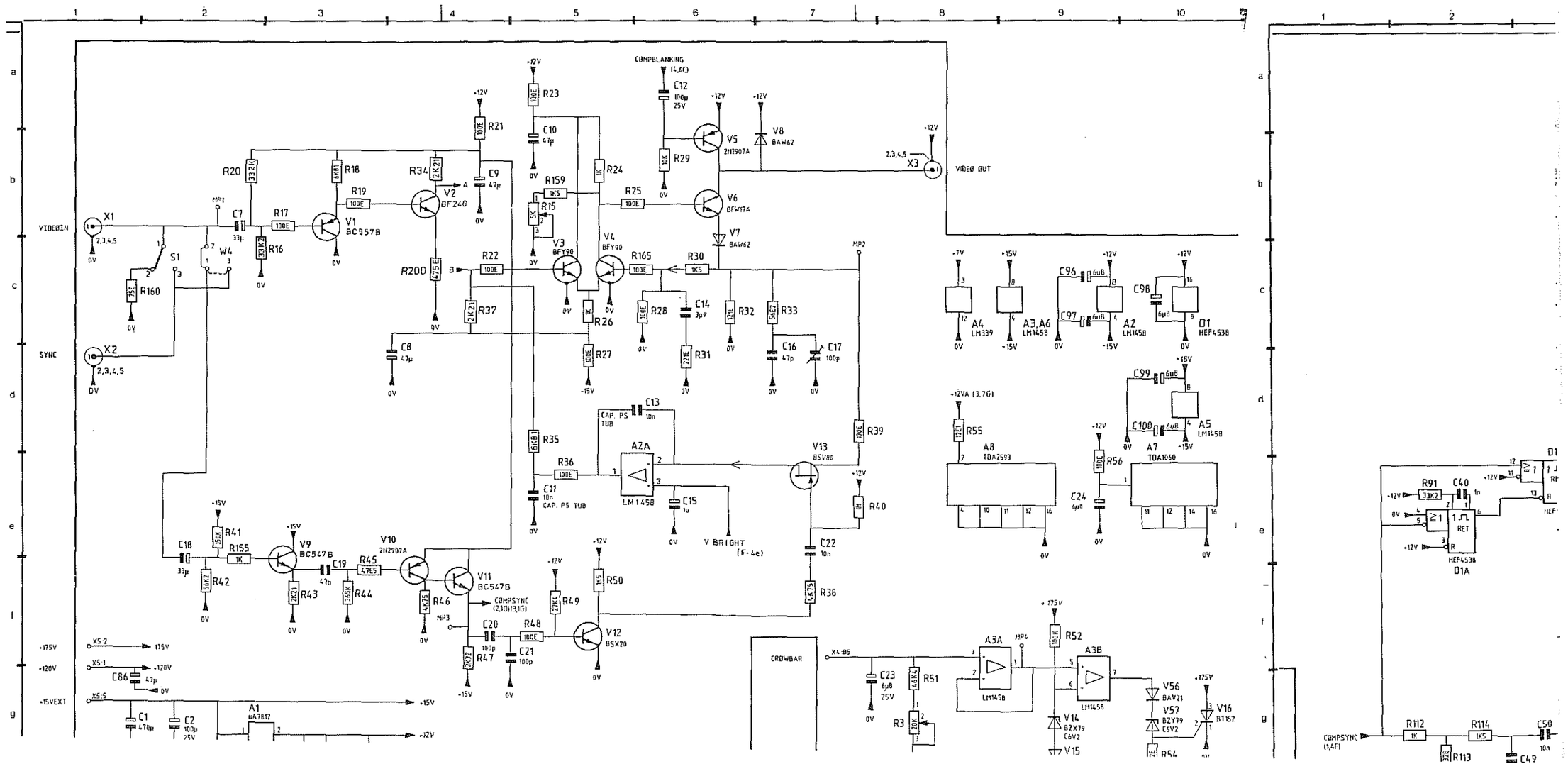

VIDEOIN
SYNC
VIDEO OUT
COMPBLANKING
CROWBAR
V BRIGHT (5-6e)
CAP. PS TUB
CAP. PS TUB
CAP. PS TUB

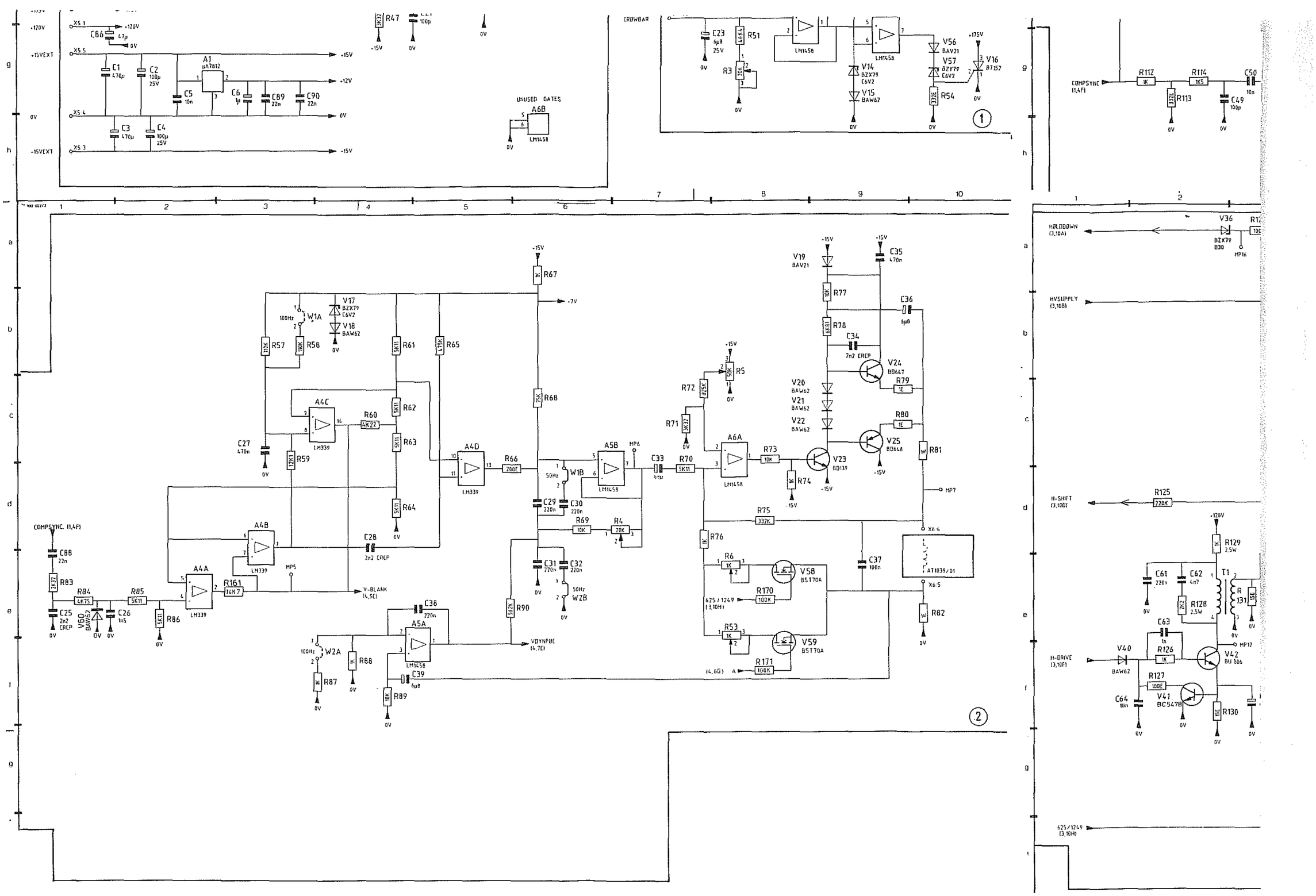

HV SUPPLY
H-SHIFT
H-DRIVE
HOLDDOWN
V BRIGHT
VIDEO OUT
A7
TDA1060
A8
TDA2593
A3A
A3,A6
A4
A5
D1
D3
D4
D8
V26
V27
V28
V29
V30
V31
V32
V33
V34
V35
V6
V7
V8
V13
W6
L1
L2
L3
X3

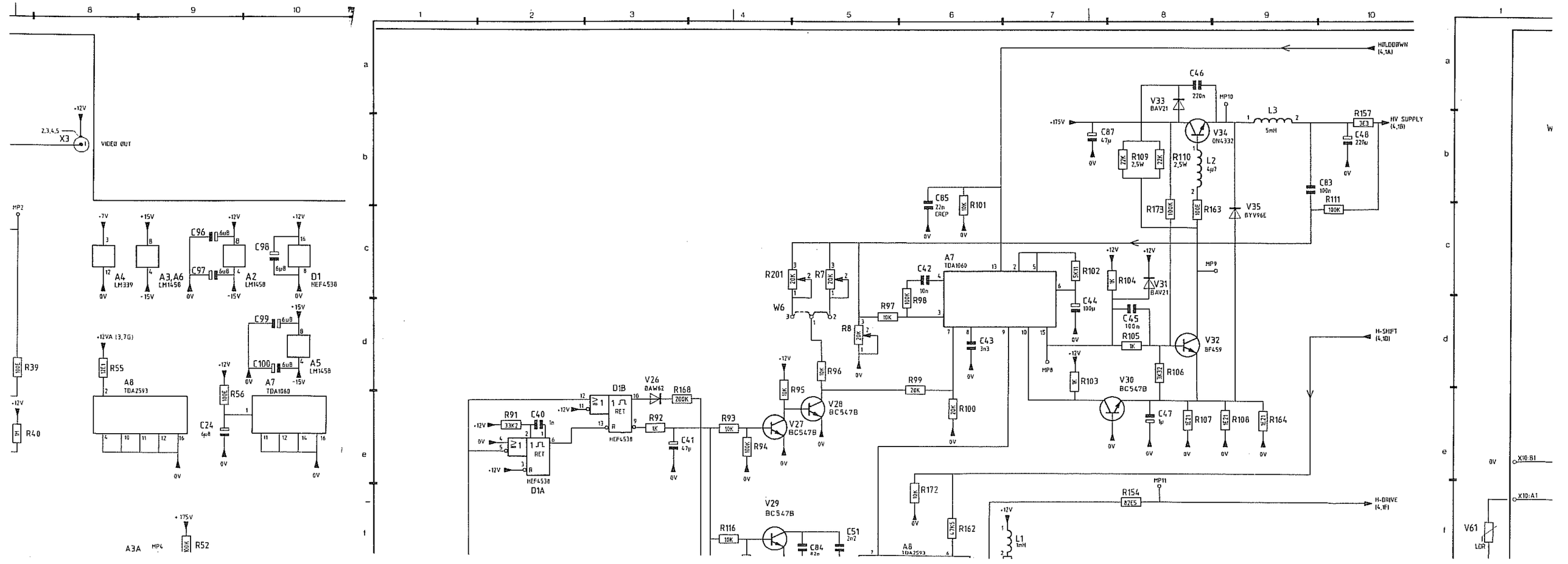
RIGHT (5-4E)
R40
C22 10n
R38 4K75
4 10 11 12 16
6µ8
0V
11 12 14 16
CROWBAR
34:B5
A3A
LM1458
MP4
+175V
R52 100K
A3B
LM1458
C23 6µ8 25V
R51 46K4
R3 20K
V14 BZX79 C6V2
V15 BAW62
V56 BAV21
V57 BZY79 C6V2
R54 332E
V16 BT152
+175V
1
7 8 9 10
HEF4538
D1A
C41 47µ
R94 100K
R172 10K
V29 BC547B
R116 10K
R117 1K
C84 82p
C51 2n2
C52 2n2
AB TDA2593
R162 47K5
R154 82E5
MP11
H-DRIVE (4,1F)
L1 1mH
R122 10E
+12VA (1,8D)(3,4G)
C57 100µ
R121 12K
R10 50K
R119 82K5
R118 3K92
C54 220n
C55 10n
C56 1µ
R120 12K1
R169 100K
R9 10K
(3,7G) +12VA
3
625/1249 (4,1H)(2,8E)
COMPSYNC (1,4F)
R112 1K
R113 332E
R114 1K5
C49 100p
C50 10n
R115 2K21
1 2 3 4 5 6 7 8 9 10
HOTDOWN (3,10A)
V36 BZX79 B30
MP16
R123 100E
V37 BAV21
T2
V38 BAX18
R167 100E
R124 10K
-36V
C59 220n
V39 BZX79 C36
HVSUPPLY (3,10B)
TO TUBE 20KV
C60 820n
V45 BAV21
R174 56K2
R175 56K2
V47 2N2907A
C70 10p
C71 10p
V46 2N2907A
R134 1K
R136 68R1
COMPBLANKING (1,6A)
V-BLANK (2,4E)
C72 1n
R135 392E
MP14
0V1
R150 100K
C82 22µ
R14 100K
V53 BAV21
X4:A2
X4:A5
X4:A1
X4:B1
X4:B2
X4:B3
X4:B4
X4:A3
X4:A4
VG1
R13 4K7
R148 100K
C81 33n
R158 10M
R149 220K
C80 33n
V52 BYV96E
FOCUS
MP15
V48 BYV96E
C77 33n
R146 2K21
C79 22n
V49 BUZ50
V50 BC547B
R147 75K
V51 BZX79 C6V2
C78 680n
R11 50K
R144 100K
R12 50K
R145 100K
VDYNFOC (2,6F)
R142 10K
R143 3K65
C74 820n
C75 5µ6
C76 5µ6
R140 10K
R141 10K
C73 W3B
L4 AT4042/33A
L6 AT4044/35
L5 AT4042/32A
R137 470E
R139 470E
R138 470E
K1
W3A
C67 13n
C68 47n
C69 22n
AT1039/01
X6:1
X6:3
V43 BUS13A
V44 BYW96E
R125 220K
MP13
R129 1K 2.5W
C65 4µ8
R132 3E92
R156 3E92
R166 15E
T1
R131
C61 220n
C62 4n7
R128 2K7 2.5W
C63 1n
R126 1K
V42 BU806
R127 100E
V41 BC547B
R130 15E
C64 10n
C66 68µ
V40 BAW62
H-SHIFT (3,10D)
H-DRIVE (3,10F)
-120V
0V1
R153 56K2
V55 BAV21
A (2,0F)
R151 10K
R152 3K32
V54 BC547B
625/1249 (3,10H)
4
a b c d e f g h
V19 BAV21
+15V
C35 470n
R77 10K
C36 6µ8
R78 5K61
C34 2n2 CRCP
V24 BD647
R79 1E
V20 BAW62
V21 BAW62
V22 BAW62
R80 1E
V25 BD648
R81 1E
-15V
R72 825K
R5 50K
R71 3K32
A5B
LM1458
MP6
C33 6n8
R70 5K11
A6A
LM1458
R73 10K
V23 BD139
R74 3K
R75 332K
MP7
X6:4
R76 1K
R6 1K
V58 BST70A
R170 100K
625/1249 (3,10H)
R53 1K
V59 BST70A
R171 100K
(4,6G)
AT1039/01
X6:5
R82 1E
C37 100n
R4 20K
R369 10K
2
A
B

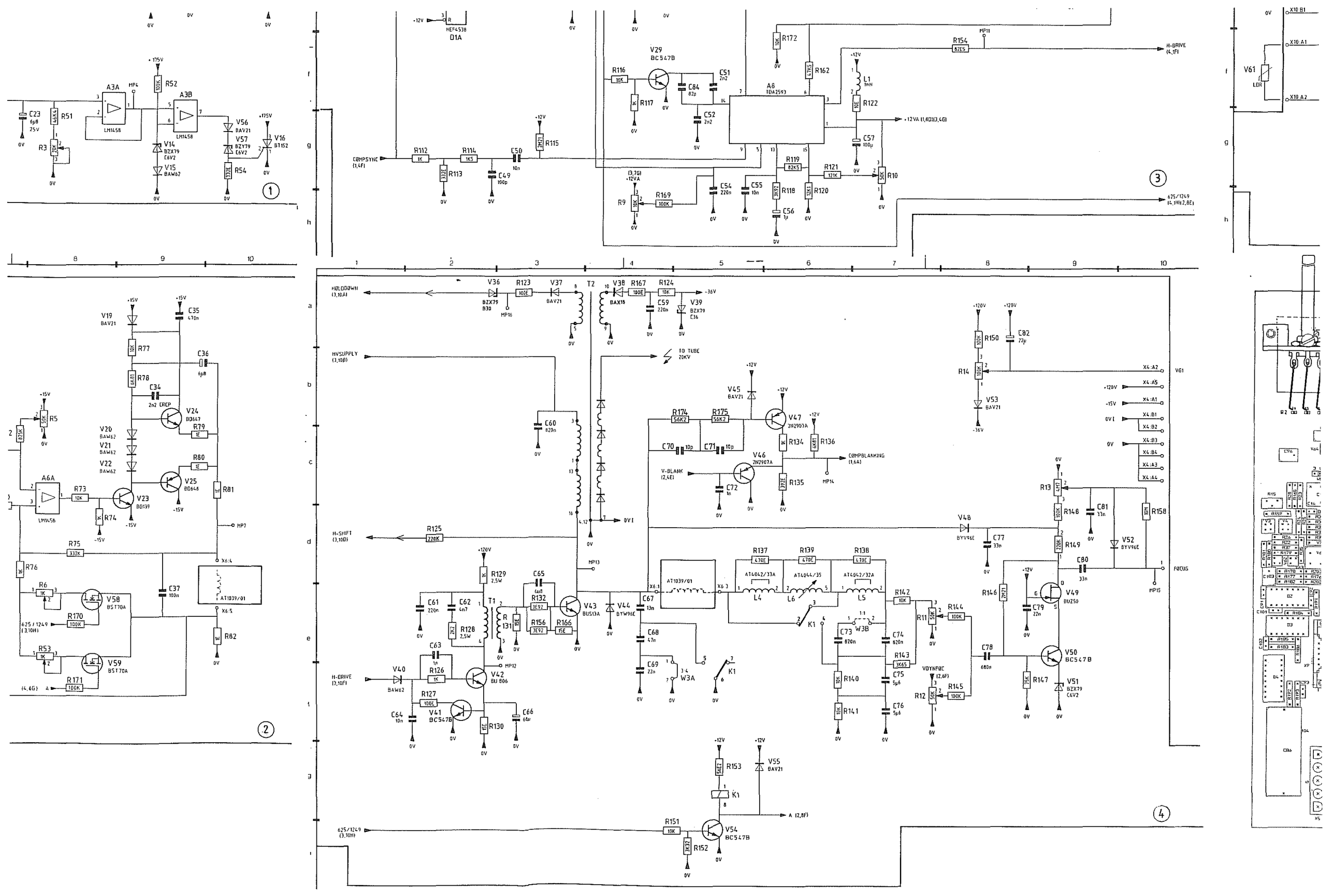

HBLODBWN (4,1A)
R157 3E3
HV SUPPLY (4,1B)
C48 220n
0V
H-SHIFT (4,1D)
H-DRIVE (4,1F)
+12V
R177 1K50
C91 22n
R178 475E
R179 332E
W7
R176 1K00
R202 237E
BF240 V63
BC557B V62
R180 6K81
R181 475E
B (BLAD 1300-1 4c)
D2 LM3046
C101 22n
R182 3K32
+5V
C92 22n
D3 LM3046
C102 22n
R186 100E
R185 1K00
C95 6,8µF 25V
A (BLAD 1300-1 4b)
R183 3K32
R184 3K32
C103 6u8
R203 15E
R1 2K21
-15V
D4 HC 4053
X9:A1
X9:B1
X9:A5
X9:A4
X9:B4
X9:A2
X9:B2
X9:A3
X9:B3
R191 10K0
V BRIGHT (1 4a)
R189 33K2
R190 15K0
W8
HC4053 D4
R2 2K2
X10:B1
X10:A1
X10:A2
V61 LDR
W5
R187 100K
R188 5K11
LM1458 A2B
R195 2K21
R194 332E
V64 BC 547B
R196 2K21
C94 33µF 6V3
D4

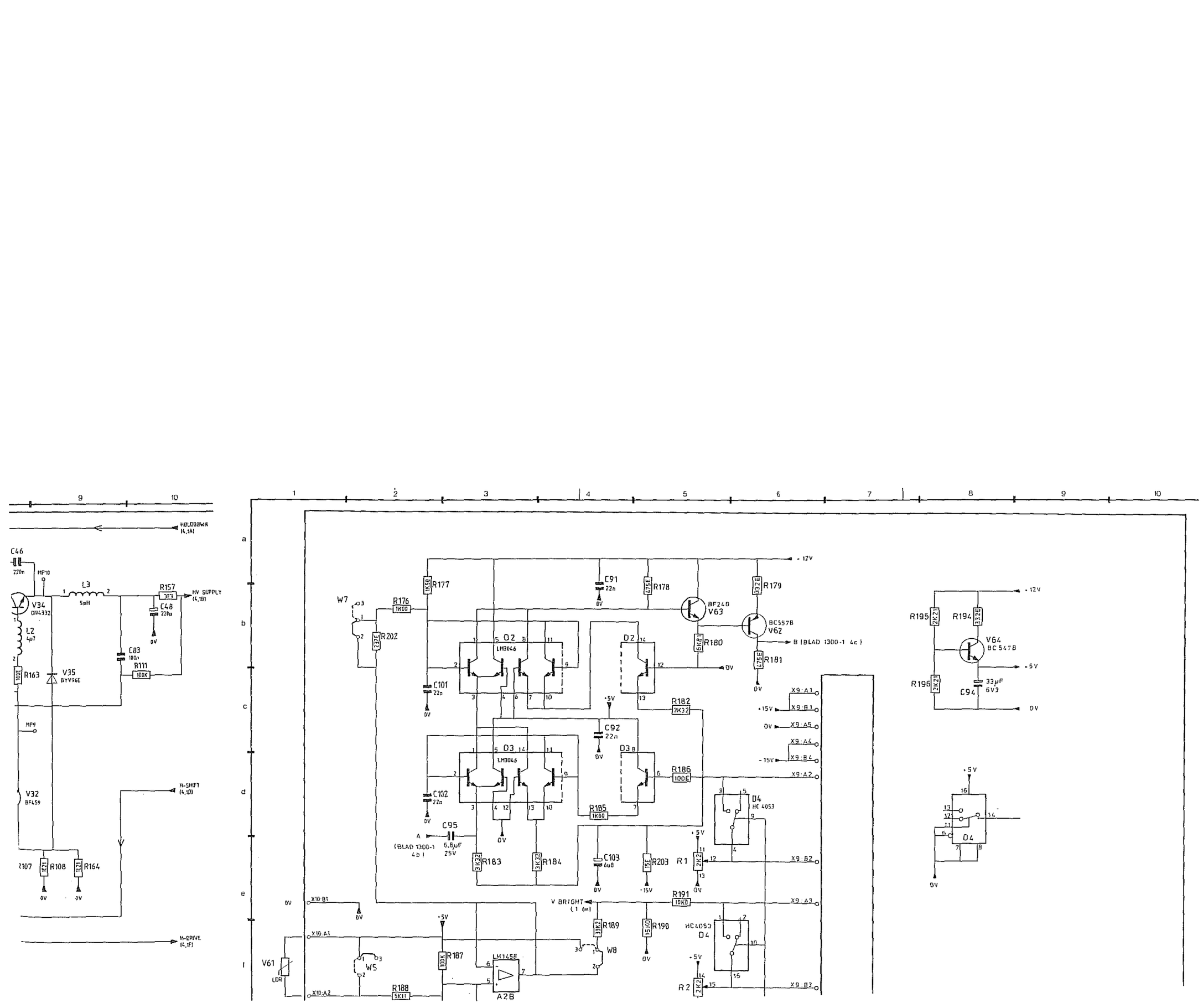

H-DRIVE (4,1F)
3
675/1249 (4,1H(2,8E)
10
X4:A2
X4:A5
X4:A1
X4:B1
X4:B2
X4:B3
X4:B4
X4:A3
X4:A4
VG1
R158
FOCUS
MP15
4
e
f
g
h
0V
X10:B1
X10:A1
X10:A2
V61
LDR
W5
R188
5K11
R187
100K
R197
68K
C104
22n
LM1458
A2B
+5V
-15V
V BRIGHT (1 6e)
R189
33K2
R190
15K0
W8
R191
10K0
HC4053
D4
X9:A3
X9:B3
X9:B5
R2
2K2
R192
47K5
R193
100K
C93
22n
5
R2 R3 R4 R5 R6 R7 R8 R1
X10
W5
W8
W3A
S1
S1A S1B S1C
X1 X2 X3 X4 X5 X6
P1 P2 P3 P4 P5 P6 P7 P8 P9 P10 P11 P12 P13 P14 P15 P16
L1 L2 L3 L4 L5 L6
T1 T2
K1
D1 D2 D3 D4
V1 V2 V3 V4 V5 V6 V7 V8 V9 V10 V11 V12 V13 V14 V15 V16 V17 V18 V19 V20 V21 V22 V23 V24 V25 V26 V27 V28 V29 V30 V31 V32 V33 V34 V35 V36 V37 V38 V39 V40 V41 V42 V43 V44 V45 V46 V47 V48 V49 V50 V51 V52 V53 V54 V55 V56 V57 V58 V59 V60 V61 V62 V63 V64
C1 C2 C3 C4 C5 C6 C7 C8 C9 C10 C11 C12 C13 C14 C15 C16 C17 C18 C19 C20 C21 C22 C23 C24 C25 C26 C27 C28 C29 C30 C31 C32 C33 C34 C35 C36 C37 C38 C39 C40 C41 C42 C43 C44 C45 C46 C47 C48 C49 C50 C51 C52 C53 C54 C55 C56 C57 C58 C59 C60 C61 C62 C63 C64 C65 C66 C67 C68 C69 C70 C71 C72 C73 C74 C75 C76 C77 C78 C79 C80 C81 C82 C83 C84 C85 C86 C87 C88 C89 C90 C91 C92 C93 C94 C95 C96 C97 C98 C99 C100 C101 C102 C103 C104
R1 R2 R3 R4 R5 R6 R7 R8 R9 R10 R11 R12 R13 R14 R15 R16 R17 R18 R19 R20 R21 R22 R23 R24 R25 R26 R27 R28 R29 R30 R31 R32 R33 R34 R35 R36 R37 R38 R39 R40

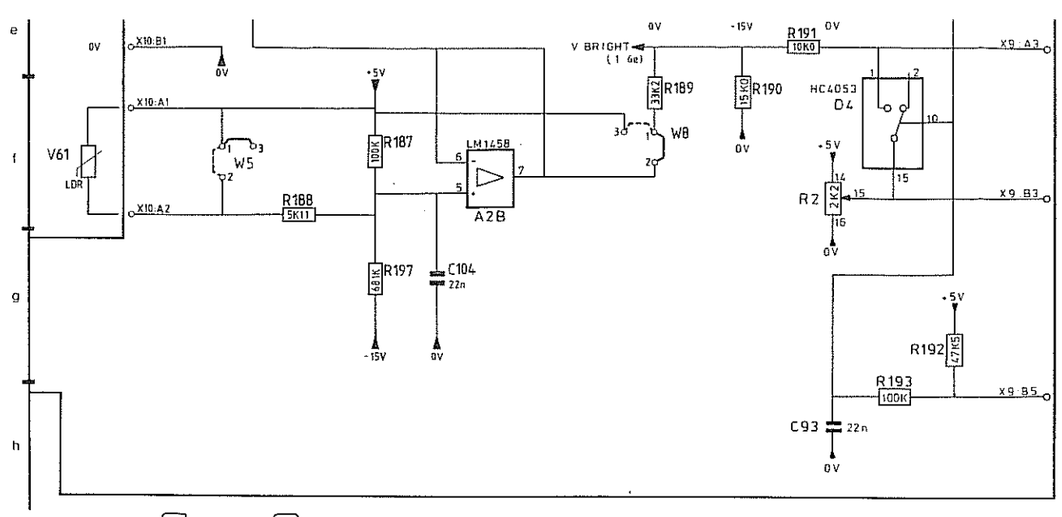

VIDEOIN
SYNC
COMPBLANKING (4,6C)
VIDEO OUT
CROWBAR
V BRIGHT (5-4e)
CAP. PS TUB
CAP. PS TUB
COMPSYNC (2,10H,31G)
COMPSYNC (1,4F)
LM1458
TDA2593
TDA1060
HEF4538
BC557B
BC547B
BF240
BFY90
BFW17A
BSV80
2N2907A
BSX20
BZY79 C6V2
BAV21
BT152
BAW62
μA7812
RET

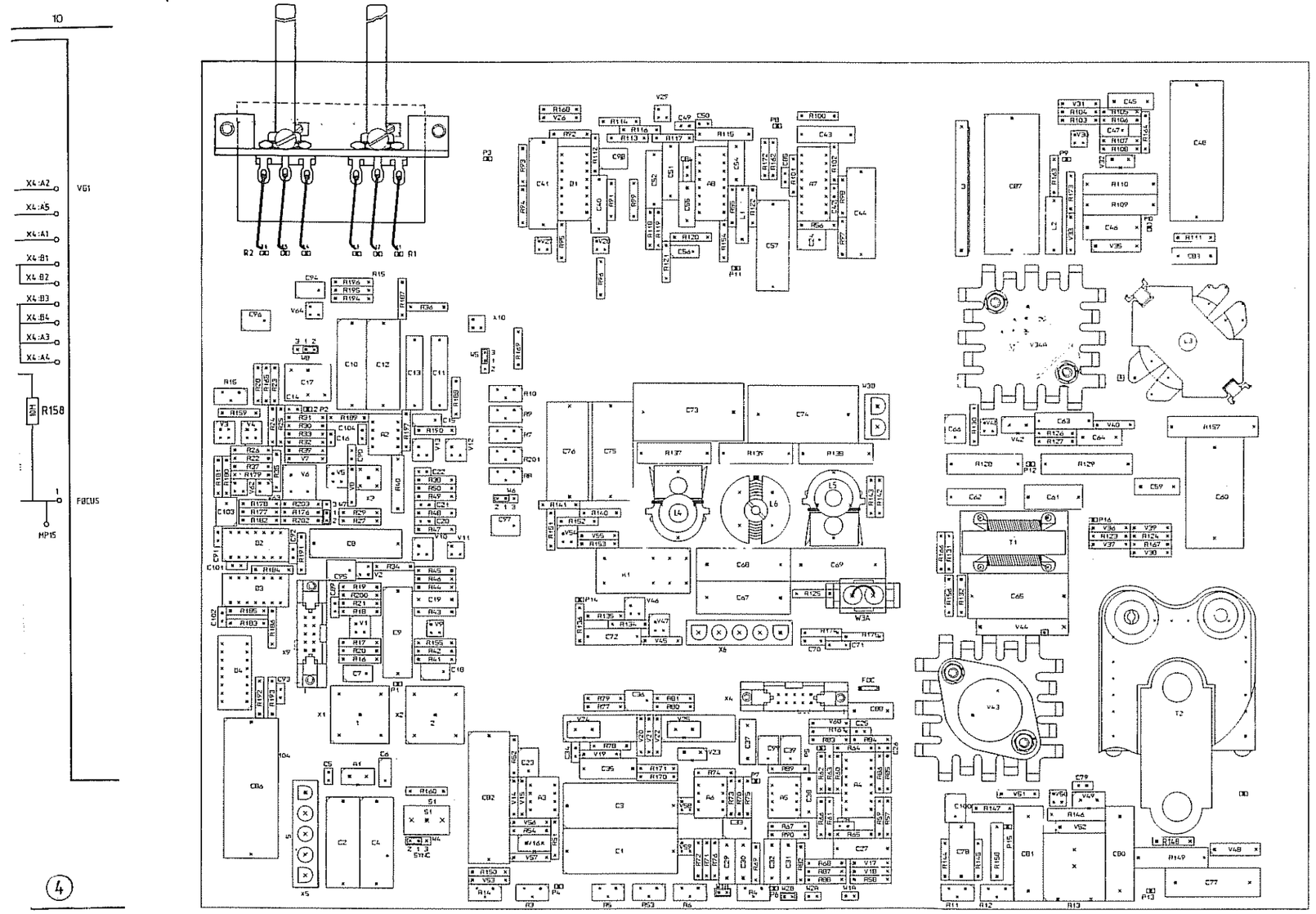

+120V
+15VEXT
0V
-15VEXT
XS.1
XS.5
XS.4
XS.3
CB6 4.7µ
C1 470µ
C2 100µ 25V
C3 470µ
C4 100µ 25V
C5 10n
C6 1µ
CB9 22n
C90 22n
A1 µA7812
R47 3K32
C21 100p
-15V
0V
UNUSED GATES
A6B
LM1458
CROWBAR
C23 6µ8 25V
R51 46K4
R3 20K
LM1458
V14 BZX79 C6V2
V15 BAW62
V56 BAV21
V57 BZY79 C6V2
V16 BT152
R54 332E
+175V
COMPSYNC (1,4F)
R112 1K
R114 1K5
C50 10n
R113 332E
C49 100p
1
2
3
4
5
6
7
8
9
10
a
b
c
d
e
f
g
h
HOLDDOWN (3,10A)
V36 BZX79 B30
MP16
R17 10E
HVSUPPLY (3,10B)
H-SHIFT (3,10D)
R125 220K
+120V
R129 2.5W
C61 220n
C62 4n7
T1
R131 15E
R128 2.5W 2K2
C63 1n
MP12
H-DRIVE (3,10F)
V40 BAW62
R126 1K
V42 BU 886
R127 100E
C64 10n
V41 BC547B
R130 15E
625/1249 (3,10H)
-15V
R67
+7V
V17 BZX79 C6V2
V18 BAW62
W1A
100Hz
R57 10K
R58 100K
R61 5K11
R65 475K
R68 75K
A4C
LM339
R60 4M22
R62 5K11
R63 5K11
C27 470n
R59 12K1
R64 5K11
A4D
R66 200E
A5B
MP6
W1B
50Hz
C29 220n
C30 220n
R69 10K
R4 20K
C31 220n
C32 220n
C33 0µ1
R70 5K11
R72 475K
R71 3K32
R5 50K
A6A
R73 10K
R74 3K
MP7
V19 BAV21
C35 470n
R77 10K
R78 6K81
C36 6µ8
C34 2n7 CREP
V24 BD647
R79 1E
V20 BAW62
V21 BAW62
V22 BAW62
R80 1E
V25 BD648
V23 BD139
R81 1E
R75 332K
R76 1K
X6.4
X6.5
AT1039/01
R6 1K
V58 BST70A
R170 100K
625/1249 (3,10H)
R53 1K
V59 BST70A
R171 100K
(4,6G)
C37 100n
R82 1E
COMPSYNC (1,4F)
C88 22n
R83 2K37
R84 4K75
R85 5K11
C25 2n2 CREP
V60 BAW62
C26 1n5
R86 5K11
A4A
R161 14K7
A4B
LM339
MP5
V-BLANK (4,5C)
C28 2n2 CREP
C38 220n
A5A
W2A
R88 1K
R87 1K
C39 6µ8
R89 10K
R90 562K
VDYNFBC (4,7E)
(4,6G)
1
2


VIDEO OUT
X3
A4 LM339
A3,A6 LM1458
A2 LM1458
D1 HEF4538
A5 LM1458
A8 TDA2593
A7 TDA1060
A3A
MP2
MP4
R39
R40
R55
R56
R52
C24
C96
C97
C98
C99
C100
HOLDDOWN (4,1A)
HV SUPPLY (4,1B)
H-SHIFT (4,1D)
H-DRIVE (4,1F)
C46
V33 BAV21
V34 ON4332
L3
5mH
L2
4µ7
L1
1mH
R157
C48
C83
R111
R173
R163
V35 BYV96E
C87
R109
R110
C85
R101
R201
R7
W6
R8
R97
R98
C42
R102
R104
V31 BAV21
C44
C45
R105
V32 BF459
R103
V30 BC547B
R106
C47
R107
R108
R164
R154
R172
R162
C43
R96
R99
R100
R95
V28 BC547B
V27 BC547B
R93
R94
R92
C41
R91
C40
D1B
D1A
HEF4538
V26 BAW62
R168
V29 BC547B
R116
C51
C84
MP8
MP9
MP10
MP11
W
X10:B1
X10:A1
V61
LDR


A3A
A3B
LM1458
R52
R51
R3
C23
V56 BAV21
V57 BZY79 C6V2
V16 BT152
V14 BZX79 C6V2
V15 BAW62
R54
D1A
HEF4538
V29 BC547B
R116
R117
C84
C51
C52
A8 TDA2593
R172
R162
R154
H-DRIVE (4,1FI)
L1
R122
+12VA (1,6DI)(3,4B)
C57
R119
R121
R10
R112
R113
R114
R115
C50
C49
COMPSYNC (1,4FI)
R9
R169
C54
C55
R118
R120
C56
3
625/1249 (4,1HI)(2,8E)
V61
LDR
X10:B1
X10:A1
X10:A2
1
HOLDDOWN (3,10A)
V36 BZX79 B30
R123
V37 BAV21
T2
V38 BAX18
R167
R124
C59
V39 BZX79 C36
HVSUPPLY (3,10B)
TO TUBE 20KV
C60
V45 BAV21
R174
R175
V47 2N2907A
C70
C71
R134
R136
V46 2N2907A
V-BLANK (2,4E)
C72
R135
COMPBLANKING (1,6A)
R125
H-SHIFT (3,10D)
V48 BYV96E
C77
R148
C81
R158
V52 BYV96E
R149
C80
FOCUS
HP15
R129
C65
C61
C62
T1
R132
R156
R166
V43 BUS13A
V44 BYW96E
C67
C68
C69
AT1039/01
L4
L6
L5
K1
W3A
W3B
R142
R144
R11
C74
C75
C76
R143
R140
R141
R146
C79
V49 BUZ50
V50 BC547B
V51 BZX79 C4V2
C78
R147
R145
R12
VDYNFOC (2,6F)
H-DRIVE (3,10F)
V40 BAW62
R126
V42 BU 806
R127
V41 BC547B
C63
C64
C66
R130
R131
R128
R150
C82
R14
V53 BAV21
VG1
X4:A2
X4:A5
X4:A1
X4:B1
X4:B2
X4:B3
X4:B4
X4:A3
X4:A4
R13
R153
V55 BAV21
K1
A (2,8F)
R151
R152
V54 BC547B
625/1249 (3,10H)
V19 BAV21
R77
C35
C36
R78
C34
V24 BD647
V20 BAW62
V21 BAW62
V22 BAW62
R79
R80
V25 BD648
R81
A6A
LM1458
R73
R74
V23 BD139
R75
R76
C37
AT1039/01
X6:4
X6:5
R82
R5
R6
V58 BST70A
R170
R53
V59 BST70A
R171
(4,6G) A
HP7
HP11
HP12
HP13
HP14
HP16
MP4
2
4

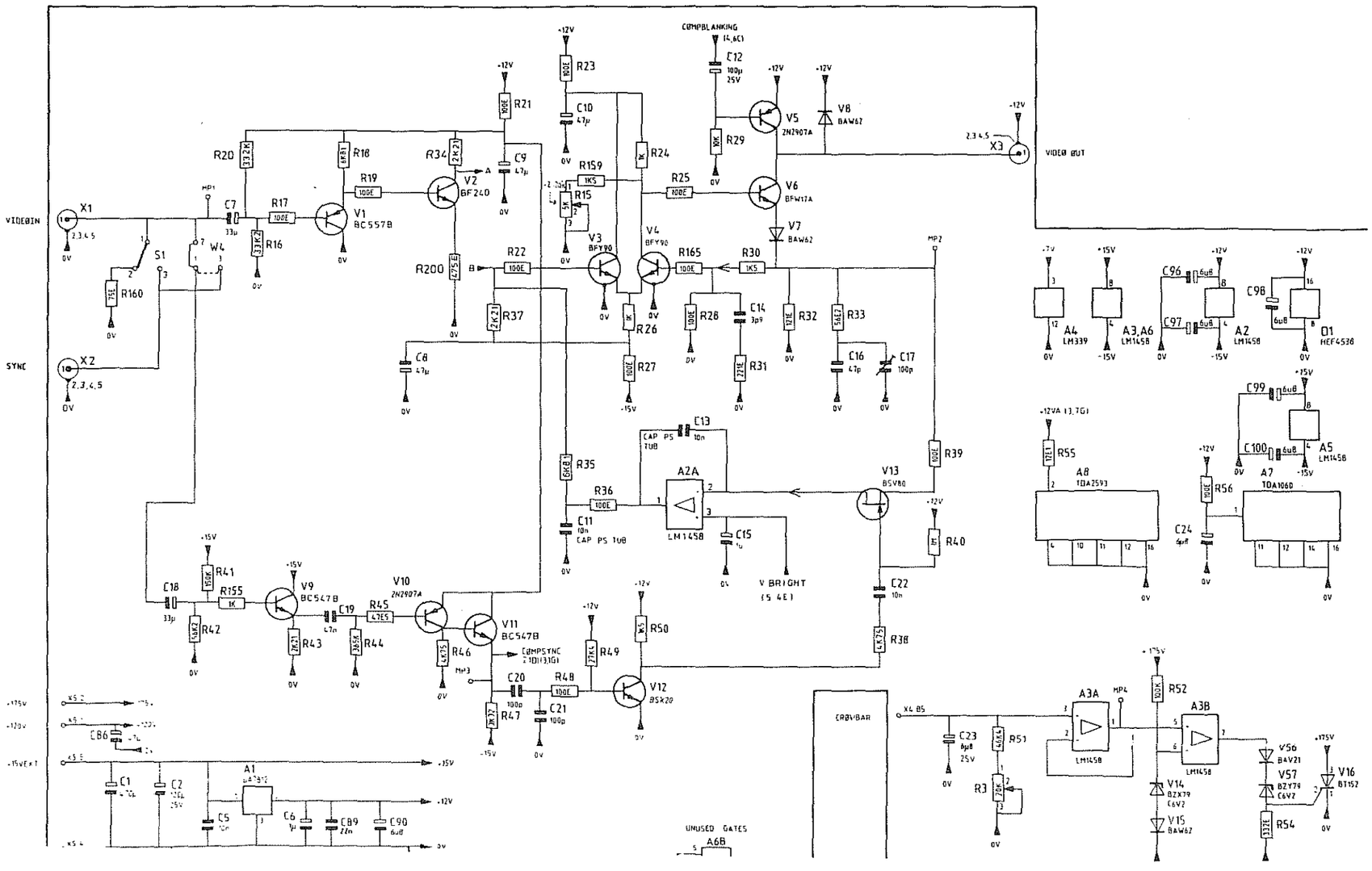

HOLDDOWN (4,1A)
C46
220n
MP10
L3
5mH
R157
3E3
HV SUPPLY (4,1B)
V34
ON4332
C48
220µ
0V
L2
4µ7
C83
10n
R111
100K
R163
100E
V35
BYV96E
MP9
V32
BF459
H-SHIFT (4,1D)
R107
1E21
R108
1E21
R164
0V
0V
H-DRIVE (4,1F)
+12V
R177
1K50
C91
22n
R178
475E
R179
332E
W7
R176
1K00
R202
237E
BF240
V63
BC557B
V62
B (BLAD 1300-1 4c)
R180
6K49
R181
175E
0V
O2
LM3046
C101
22n
D2
R182
2K32
+5V
C92
22n
D3
LM3046
C102
22n
R186
100E
R185
1K00
C95
A
(BLAD 1300-1 4b)
6,8µF 25V
R183
3K32
R184
3K32
C103
6u8
R203
15E
-15V
D4
HC 4053
R1
2K2
R191
10K0
V BRIGHT (1 6e)
R189
33K2
R190
15K0
W8
HC4053
D4
R2
2K2
X10:B1
X10:A1
X10:A2
V61
LDR
W5
R187
100K
R188
5K11
LM1458
A2B
X9:A1
X9:B1
X9:A5
X9:A4
X9:B4
X9:A2
X9:B2
X9:A3
X9:B3
R195
2K21
R194
332E
V64
BC 547B
R196
2K21
33µF
C94
6V3
D4





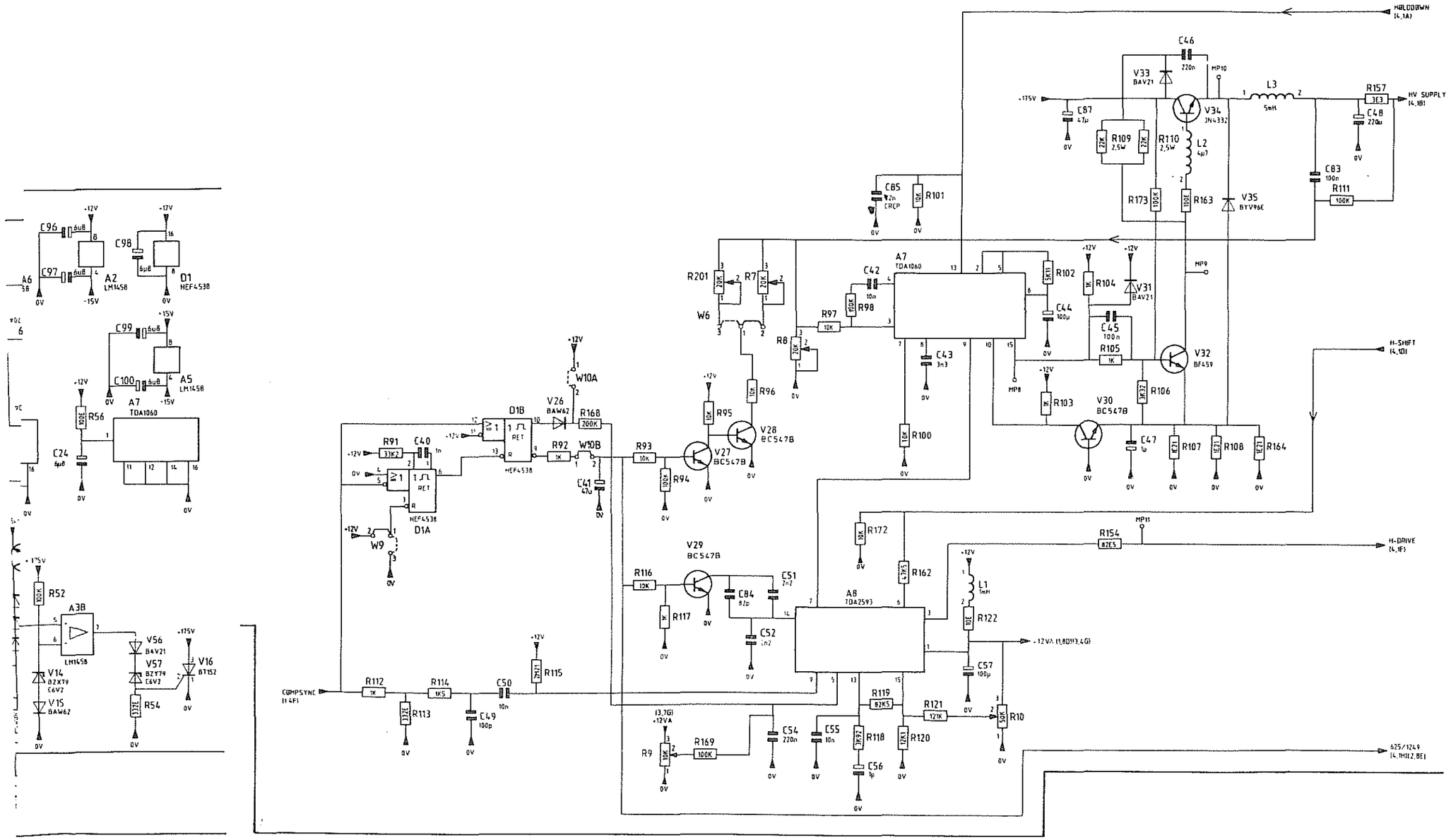
WM 10

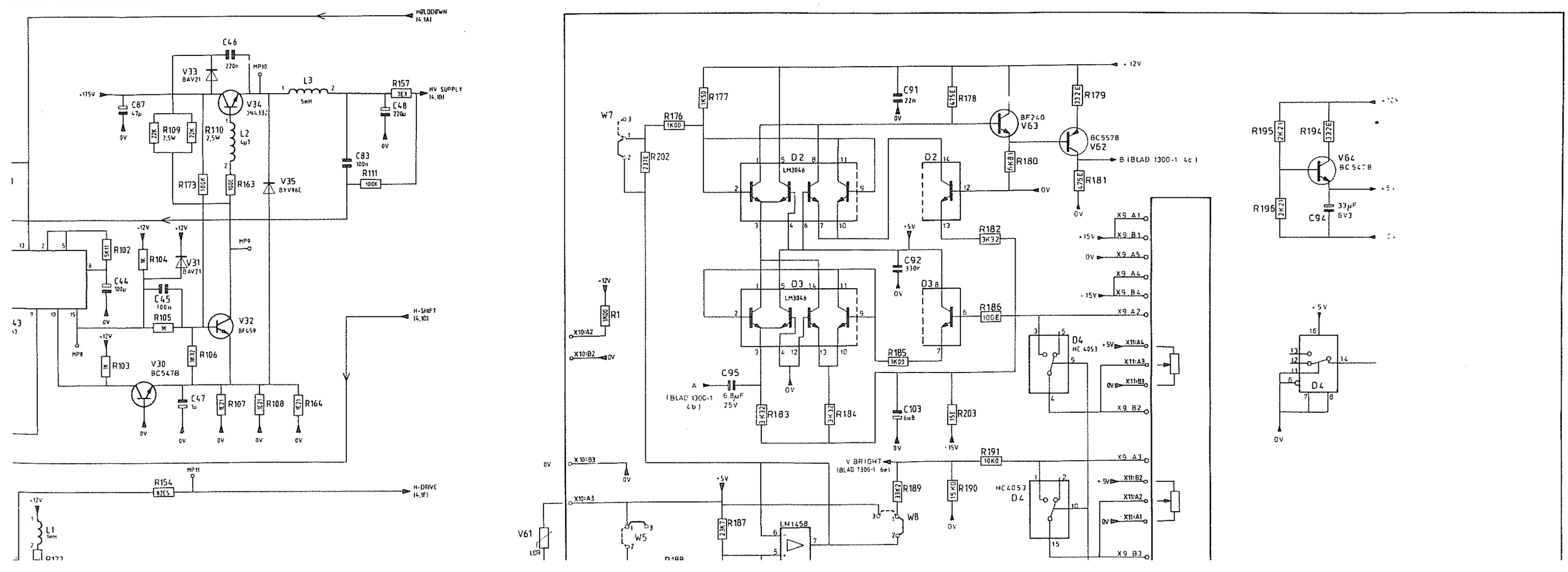
BASIC 20 MON. HR
4522 108 09854

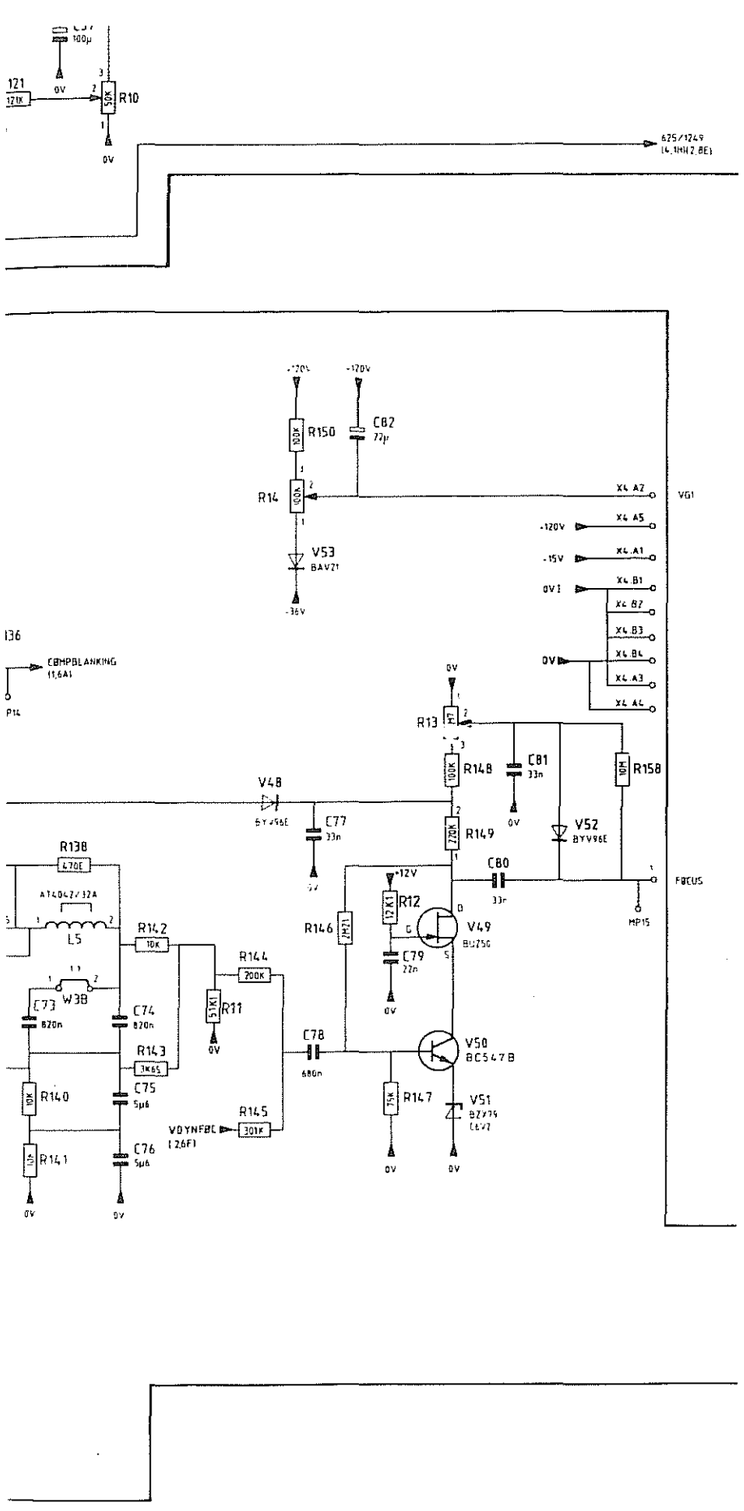

VIDEOIN
SYNC
VIDEO OUT
COMPBLANKING
(4,6C)
CAP PS TUB
V BRIGHT
(5 4E)
CBVBAR
UNUSED GATES
A6B
A1
A2A
A3A
A3B
A2
A3,A6
A4
A5
A7
A8
TDA1060
TDA2593
LM1458
LM339
HEF4538
BC547B
BF240
BFY90
BFW17A
BSV80
BSX20
ZN2907A
BAW62
BAV21
BZX79 C6V2
BT152
+12V
-12V
+15V
-15V
0V

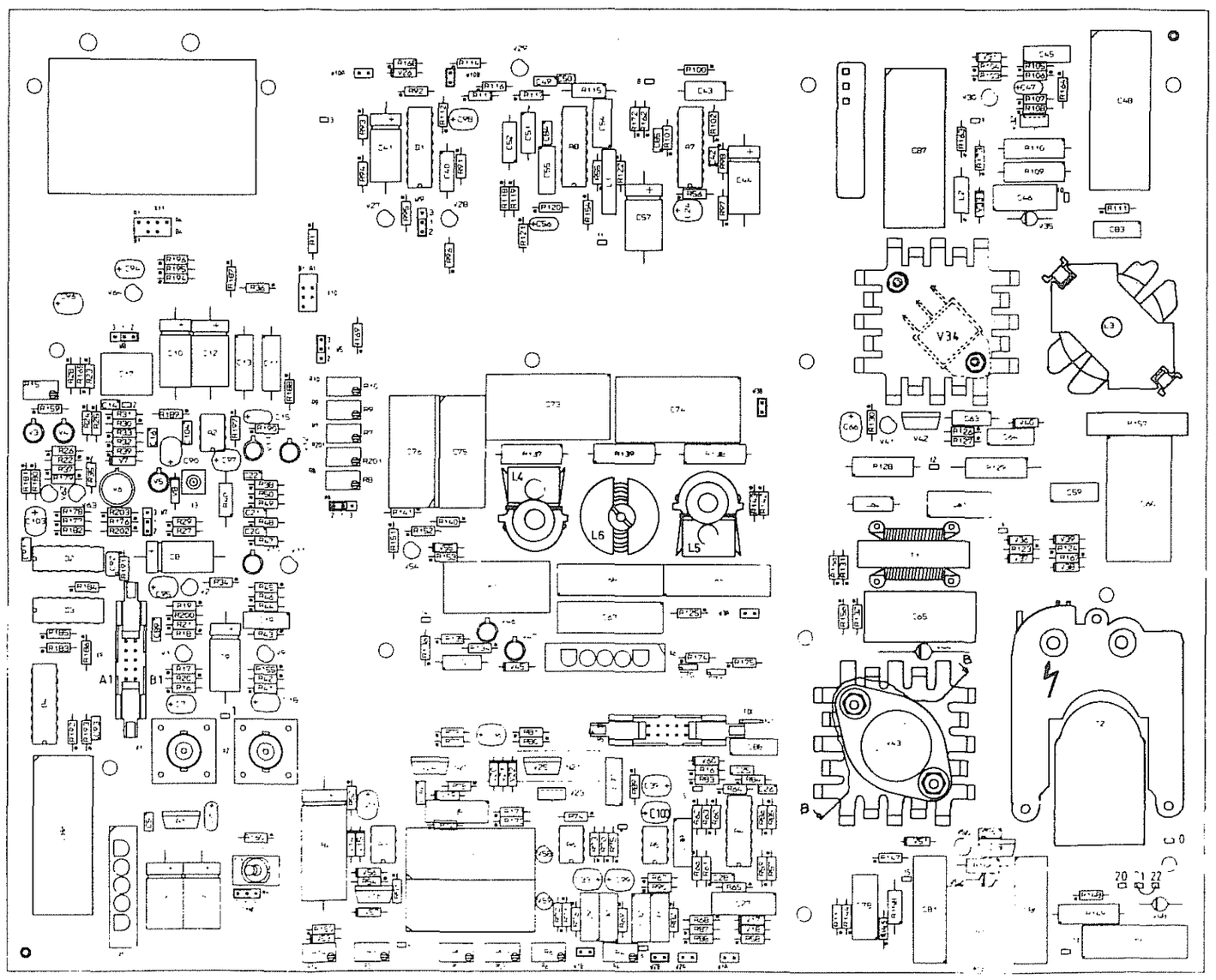
A1 LA7812
C1 470µ
C2 100µ 25V
C3 470µ
C4 100µ 25V
C5 10n
C6 1µ
C86 -?-
C89 22n
C90 6u8
MP0
UNUSED GATES
A6B LM1458
R47 1K2 1000
C21 100p
C23 6µ8 75V
R51 4K642
R3 22K
LM1458
V14 BZY79 C6V2
V15 BAW62
V56 BAV21
V57 BZY79 C6V2
R54 332K
V16 BT152
A4C LM339
R60 4K22
R62 5K11
R63 5K11
R64 5K11
C27 470n
R59 12K1
A4B LM339
A4A LM339
R161 14K7
C88 22n
R83 12K1
R84 6K25
R85 5K11
C25 4n7
V60 BAW62
C26 10n
R86 5K11
C28 2n2 CERP
R61 5K11
R65 4K75
R67 1K
R68 2K4
V17 BZX79 C6V2
V18 BAW62
W1A
R57 10K
R58 10K
A4D LM339
R66 200E
W1B
C29 220n
C30 220n
R69 10K
R4 20K
C31 220n
C32 220n
W2B
R90 560K
C38 220n
A5A LM1458
W2A
R88
R87
C39 6u8
R89 10K
A5B LM1458
C33 22n
R70 5K11
R72 825K
R71 3K32
R5 50K
A6A LM1458
R73 75K
R74 1K
R75 332K
R76 1K
R6 1K
R170 100K
R53 1K
R171 100K
V58 BST70A
V59 BST70A
V19 BAV21
V20 BAW62
V21 BAW62
V22 BAW62
C35 470n
R77 10K
C36 6µ8
R78 4K81
C34 2n2 CERP
V24 BD647
R79 1E
R80 1E
V25 BD648
V23 BD139
R81 1E
MPT
C37 100n
X6 4
AT1039/01
X6 5
R82
HOLDOBW
(3,10A)
HVSUPPL
(3,10B)
H-SHIFT
(3,10D)
H-DRIVE
(3,10F)
625/1
(3,10

V15 BAW62
R54 33E
COMPSYNC (3.6F)
1K
1K5
R113 33E
C49 100p
R9 10K
R169 100K
C54 220n
C55 10n
R119 82K5
R118 3K97
C56 3µ
R120 12K1
R121 121K
R10 56K
675/1249 (4.1H)(2.8E)
C35 470n
R77
C36 6µ8
R78
C34 2n2 CACP
V24 BD647
R79 1E
R80 1E
V25 BD648
V23 BD139
R81 5µ
MP3
X6.4
C37 100n
AT1039/01
X6.5
R82 5µ
HBLOODOWN (3.10A)
V36 BZX79 B27
R123 1K
MP16
V37 BAV21
T2
V38 BAV21
R167 22.1E
R124 10K
C59 220n
V39 BZX79 C36
HVSUPPLY (3.10B)
TO TUBE 20KV
C60 820n
MP20
MP21
MP22
H-SHIFT (3.10D)
R125 220K
MP13
R129 2.5W
C65 8µ8
R132 3E92
R156 3E92
R166 15E
V43 BU513A
V44 BYW96E
C67 33n
+2 : 12.7n
C68 47n
C69 22n
W3A
K1
C61 220n
C62 47n
T1
R128 2.5W
R131 15E
C63 1n
R126 1K
V40 BAW62
V42 Bu 806
R127 100E
V41 BC547B
C64 10n
R130 1K
C66 68µ
H-DRIVE (3.10F)
V45 BAV21
R174 56K2
R175 56K2
V47 2N2907A
C70 10p
C71 10p
R134 6K81
R136
COMPBLANKING (1.6A)
V46 2N2907A
V-BLANK (2.4E)
C72 1n
R135 10E
MP14
R137 470E
R139 470E
R138 470E
AT4042/33A
AT4044/35
AT4042/32A
L4
L6
L5
K1
W3B
C73 820n
R140 10K
R141 33K
C74 820n
R143 3K65
C75 5µ6
C76 5µ6
R142 10K
R144 200K
R11 51K1
VOYNFBC (2.6F)
R145 301K
R150 100K
C82 22µ
R14 100K
V53 BAV21
X4 A2
X4 A5
X4 A1
X4 B1
X4 B2
X4 B3
X4 B4
X4 A3
X4 A4
VG1
V48 BYV96E
C77 33n
R148 100K
R149 220K
C81 33n
R158 10K
V52 BYV96E
C80 33n
FOCUS
MP15
R13 47K
R12 12K1
V49 BC550
R146 1M11
C79 22n
C78 680n
R147 39K
V50 BC547B
V51 BZX79 C6V2
R153 5K6
V55 BAV21
K1
A (2.8F)
625/1249 (3.10H)
R151 10K
V54 BC547B
R152 3K32


A6 3B
C96 6u8
C97 6u8
A2 LM1458
D1 HEF4538
C98 6u8
C99 6u8
C100 6u8
A5 LM1458
A7 TDA1060
R56 100E
C24 6u8
A3B LM1458
R52 100K
V14 BZX79 C6V2
V15 BAW62
V56 BAV21
V57 BZY79 C6V2
V16 BT152
R54 133E
D1B
D1A
HEF4538
R91 33K2
C40 1n
R92 1K
R93 10K
R94 100K
R95 10K
R96 10K
V26 BAW62
R168 200K
W10A
W10B
W9
V27 BC547B
V28 BC547B
C41 47u
R100 10K
R201 20K
R7 20K
R8 20K
W6
R97 10K
R98 680K
C42 10n
A7 TDA1060
C43 3n3
R102 3K11
R104 1K
V31 BAV21
C44 100u
C45 100n
R105 1K
V32 BF459
R103 1K
V30 BC547B
R106 3K32
C47 4u
R107 1K21
R108 1K21
R164 1K21
MP9
MP8
H-SHIFT (4,10)
V29 BC547B
R116 10K
R117 1K
C51 2n7
C84 82p
C52 1n2
R172 10K
R154 82E5
MP11
H-DRIVE (4,1F)
A8 TDA2593
R162 47K5
L1 1mH
R122 10E
+12V (1,8D)(3,4G)
C57 100u
R112 1K
R114 1K5
C50 10n
R115 2K21
R113 133E
C49 100p
CSYNC (1,4F)
R119 82K5
R121 121K
R10 50R
R9 10K
R169 100K
C54 220n
C55 10n
R118 3K92
R120 12K1
C56 4u
625/1249 (4,7H)(2,8E)
C46 220n
V33 BAV21
MP10
L3 5mH
R157 3E3
HV SUPPLY (4,1B)
C48 220u
C83 100n
R111 100K
R173 100K
R163 100K
V35 BYV96E
C85 2n CKCP
R101 10K
HOLDOWN (4,1A)
W7
R20 2332
R1 1K00
X10:A2
X10:B2
X10:B3
X10:A3
X10:B4
V61 LDR
W5

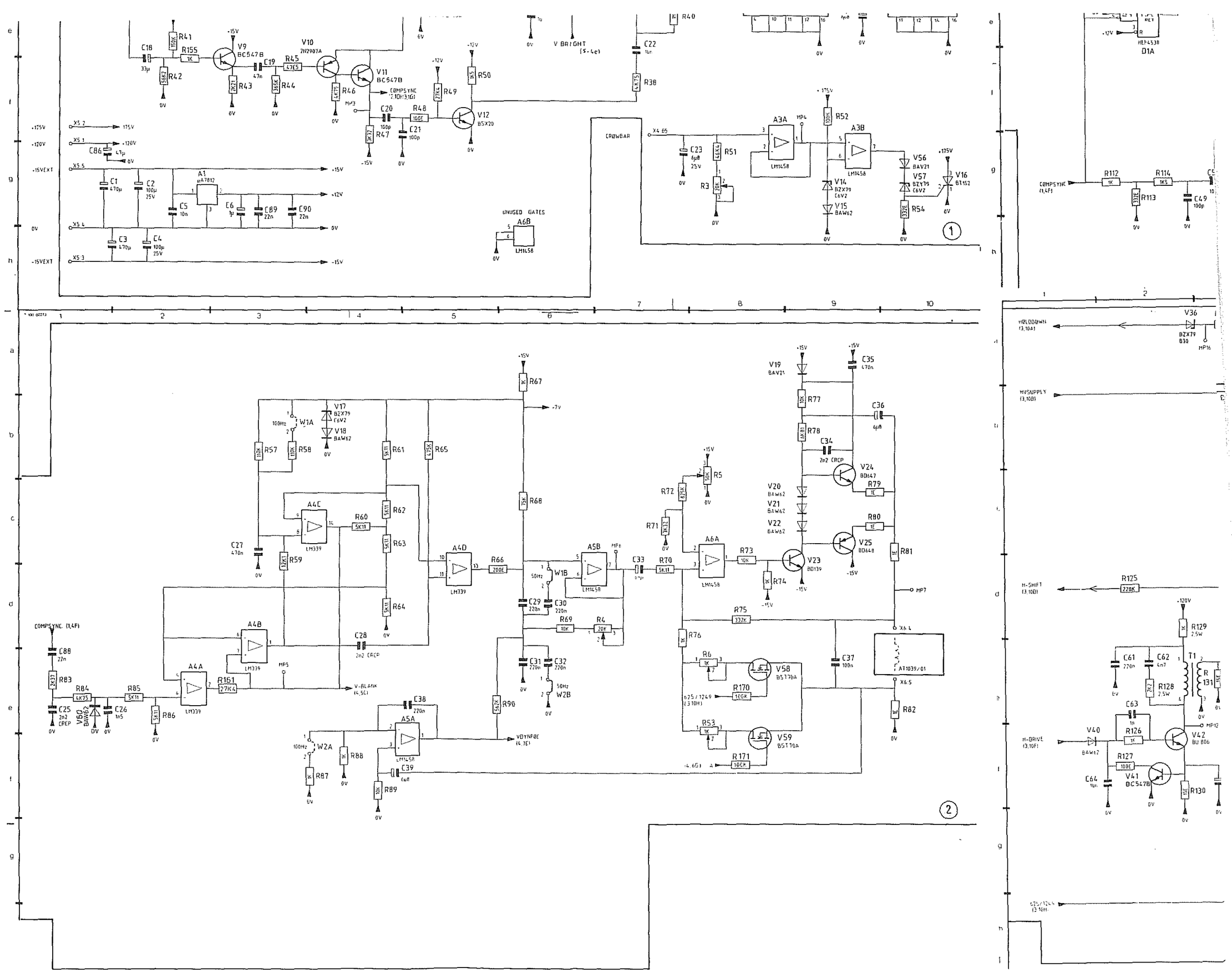

HOLOOGWN
(4,1A)
C46
220n
MP10
V33
BAV21
+175V
L3
5mH
R157
3E3
HV SUPPLY
(4,1B)
C87
47µ
0V
R109
2,5W
22K
R110
2,5W
L2
4µ7
V34
2N4332
C48
270u
C83
100n
R111
100K
R173
100E
R163
V35
BYV96E
-12V
MP9
R102
1K
R104
V31
BAV21
C44
100µ
C45
100n
R105
1K
V32
BF459
H-SHIFT
(4,1D)
MP8
R103
V30
BC547B
R106
3K32
C47
1µ
R107
R108
R164
1K21
R154
82E5
MP11
H-DRIVE
(4,1F)
L1
1mH
R172
W7
R176
1K00
R177
1K50
R202
237E
C91
22n
R178
475E
BF240
V63
R179
332E
BC557B
V62
R180
6K81
R181
475E
B (BLAD 1300-1 4c)
D2
LM3046
D3
LM3046
R182
3K32
C92
330n
R186
100E
R185
1K00
C95
6,8µF
25V
(BLAD 1300-1
4b)
R183
3K32
R184
3K32
C103
6u8
R203
15E
R1
1K00
X10:A2
X10:B2
X10:B3
X10:A3
V61
LDR
W5
R187
23K7
LM1458
R189
33K2
R190
15K0
WB
R191
10K0
V BRIGHT
(BLAD 1300-1 6e)
D4
HC4053
X9 A1
X9 B1
X9 A5
X9 A4
X9 B4
X9 A2
X9 B2
X9 A7
X9 B7
X11:A4
X11:A3
X11:B3
X11:B2
X11:A2
X11:A1
R195
2K21
R194
332E
V64
BC547B
R196
2K21
C94
33µF
6V3
+5V
0V
-15V

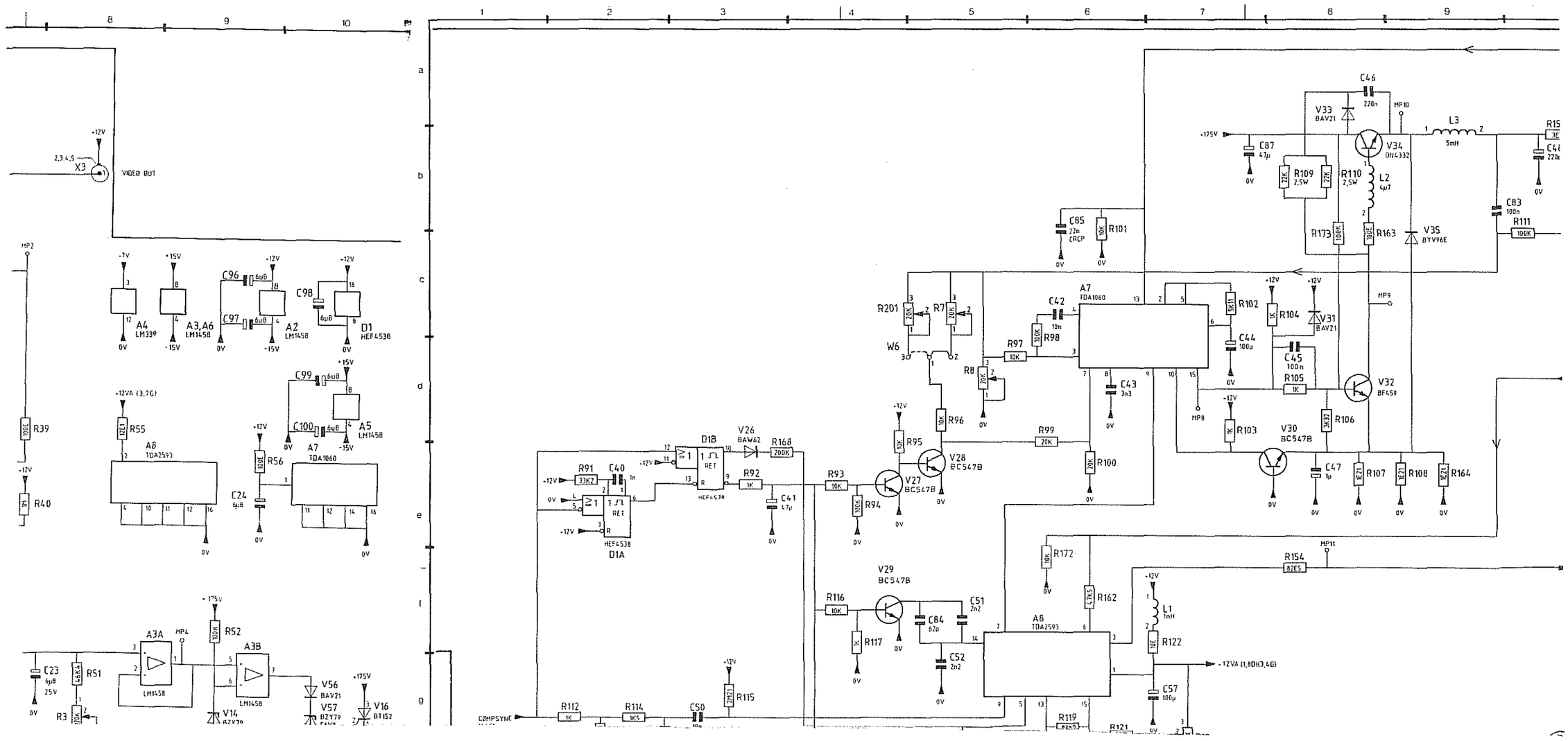


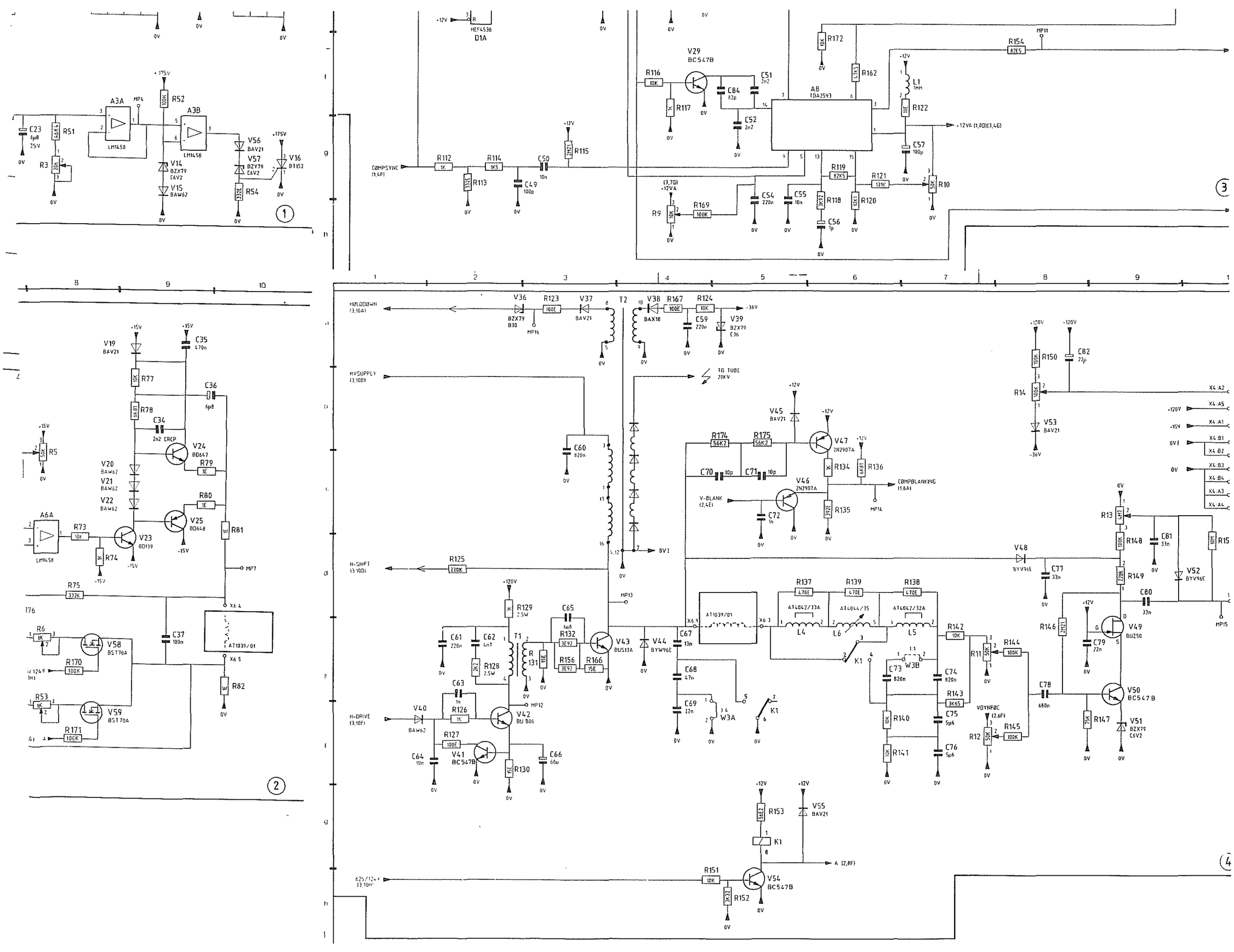


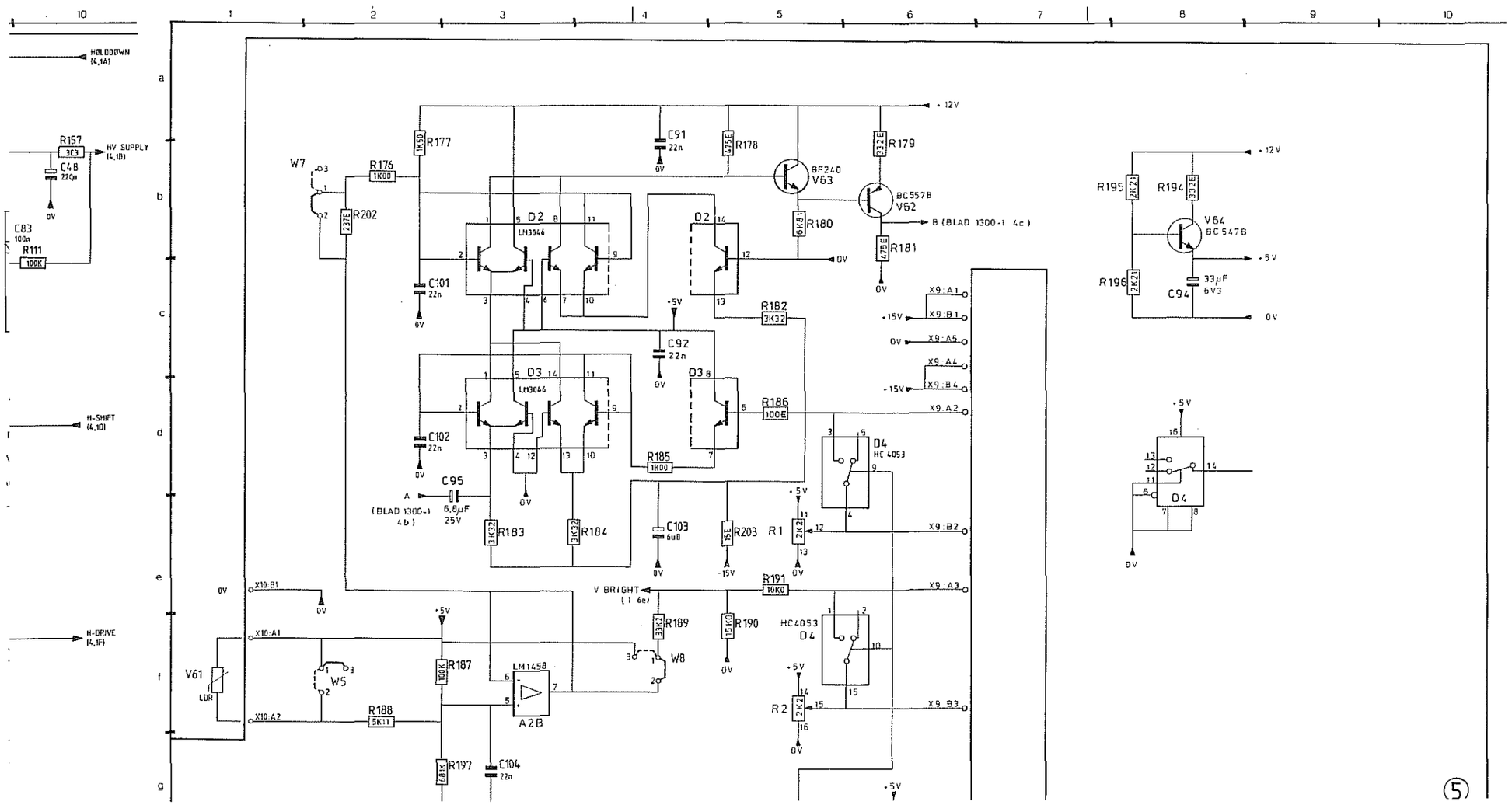
BASIC 15 20" MON.
4522 108 11651 / 2

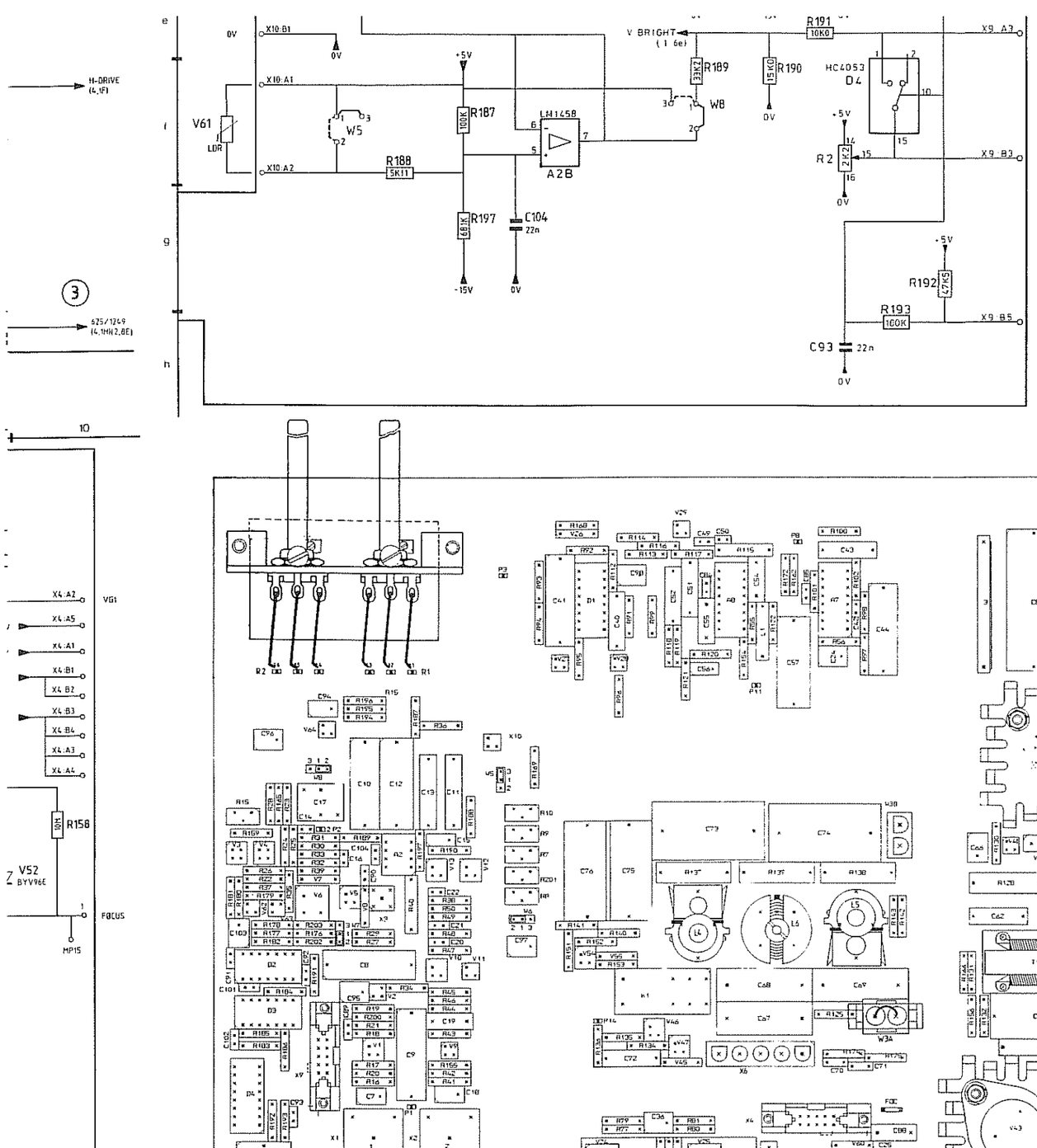
VIDEOIN
SYNC
VIDEO OUT
COMPBLANKING (4,6C)
CROWBAR
UNUSED GATES
V BRIGHT (5-4e)
COMPSYNC (2,10f 3,1G)
HORLOGAGE (3,10A)
CAP PS TUB
MP1
MP2
MP3
MP4
A1 µA7812
A2 LM1458
A2A LM1458
A3A LM1458
A3B LM1458
A3,A6 LM1458
A4 LM339
A5 LM1458
A6B LM1458
A7 TDA1060
A8 TDA2593
D1 HEF4538
D1A HEF4538
V1 BC557B
V2 BF240
V3 BF90
V4 BF90
V5 2N2907A
V6 BFW17A
V7 BAW62
V8 BAW62
V9 BC547B
V10 2N2907A
V11 BC547B
V12 BSX20
V13 BSV80
V14 BZX79 C6V2
V15 BAW62
V16 BT152
V36

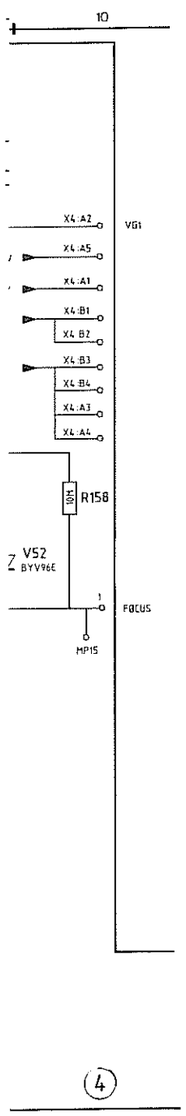

+175V
+120V
+15VEXT
0V
-15VEXT
X5.2
X5.1
X5.5
X5.4
X5.3
C86 47µ
C1 470µ
C2 100µ 25V
C3 470µ
C4 100µ 25V
A1 µA7812
C5 10n
C6 1µ
C89 22n
C90 22n
R41 150K
R155 1K
C18 33µ
R42 56K2
R43 2K21
R44 365K
C19 47n
R45 47K5
R46 4K75
V9 BC547B
V10 2N2907A
V11 BC547B
R47 1K72
C20 100p
R48 160E
C21 100p
R49 77K4
R50 1K5
V12 BSX20
COMPSYNC (2,10H;3,10G)
V BRIGHT (5-4e)
R40
C22 10n
R38 4K75
CROWBAR
X4.65
C23 6µ8 25V
R51 464K2
R3 20K
A3A LM1458
A3B LM1458
MP4
R52 100K
V14 BZX79 C6V2
V15 BAW62
V56 BAV21
V57 BZX79 C6V2
R54 332E
V16 BT152
UNUSED GATES
A6B LM1458
1
HEF4538 D1A
COMPSYNC (1,4F)
R112 1K
R114 1K5
R113 332E
C49 100p
HOLDDOWN (3,10A1)
V36 BZX79 B30
MP16
HVSUPPLY (3,10B1)
R67 1K
W1A 100Hz
V17 BZX79 C6V2
V18 BAW62
R57 110K
R58 110K
R61 5K11
R65 4K75
R62 5K11
R63 5K11
R64 5K11
R60 5K11
A4C LM339
C27 470n
R59 12K1
A4D LM339
R66 200E
R68 3K
W1B 50Hz
A5B LM1458
C33 0µ1
C29 220n
C30 220n
R69 10K
R4 20K
C31 220n
C32 220n
W2B 50Hz
R90 5K62
R70 5K11
R72 475K
R5 50K
R71 1M32
A6A LM1458
R73 10K
R74 1K
R75 332K
R76 1K
R6 1K
R53 1K
V58 BST70A
V59 BST70A
R170 100K
R171 100K
C37 100n
X6.6
AT1039/01
X6.5
R82 1K
R81 1E
MP7
V19 BAW21
V20 BAW62
V21 BAW62
V22 BAW62
C35 470n
R77 10K
C36 6µ8
R78 4K87
C34 2n2 CRCP
V24 BD647
R79 1E
R80 1E
V25 BD648
V23 BD139
V24 BD647
COMPSYNC (1,4F)
C88 22n
R83 2K37
R84 4K75
C25 2n2 CPEP
V60 BAW62
C26 1n5
R85 5K11
R86 5K11
A4A LM339
A4B LM339
R161 27K4
MP5
V-BLANK (4,5C)
C28 2n2 CRCP
C38 220n
A5A LM1458
W2A 100Hz
R87 1K
R88 1K
C39 6µ8
R89 10K
VDYNFBE (4,7E)
R125 220K
H-SHIFT (3,10D1)
R129 2,5W 1K
C61 220n
C62 4n7
T1
R131 15E
R128 2,5W 2K7
C63 1n
R126 1K
V40 BAW62
V42 BU806
MP12
H-DRIVE (3,10F1)
R127 100E
V41 BC547B
C64 10n
R130 15E
625/1249 (3,10H)
1
2


VIDEO OUT
X3
A4 LM339
A3,A6 LM1458
A2 LM1458
D1 HEF4536
A8 TDA2593
A7 TDA1060
A5 LM1458
A3A
A3B
LM1458
D1A
D1B
HEF4538
V56 BAV21
V57 BZY79
V16 BT152
V14
V26 BAW62
V27 BC547B
V28 BC547B
V29 BC547B
V30 BC547B
V31 BAV21
V32 BF459
V33 BAV21
V34 DN4332
V35 BYV96E
L1 1mH
L2 4µ7
L3 5mH
COMPSYNC
+12VA (1,8DH3,4G)


A3A
A3B
LM1458
MP4
R52
R51
C23
R3
V14
BZX79 C6V2
V15
BAW62
V56
BAV21
V57
BZX79 C6V2
V16
BT152
R54
D1A
HEF4538
R112
R113
R114
R115
C49
C50
COMPSYNC (1,4F)
V29
BC547B
R116
R117
C84
C51
C52
A8
TDA2593
R172
R162
R154
MP11
L1
R122
C57
R119
R121
R10
R9
R169
C54
C55
R118
R120
C56
+12VA (1,8D)(3,4G)
HFLOODOWN (3,10A)
V36
BZX79 B30
R123
V37
BAV21
T2
V38
BAX18
R167
R124
C59
V39
BZX79 C36
HVSUPPLY (3,10B)
TO TUBE 20KV
C60
V45
BAV21
V47
2N2907A
R174
R175
C70
C71
V46
2N2907A
R134
R136
R135
V-BLANK (2,4E)
COMPBLANKING (1,6A)
C72
R150
C82
R14
V53
BAV21
X4.A2
X4.A5
X4.A1
X4.B1
X4.B2
X4.B3
X4.B4
X4.A3
X4.A4
R13
R148
C81
R15
V48
BYV96E
C77
R149
V52
BYV96E
C80
R146
V49
BUZ50
C79
V50
BC547B
V51
BZX79 C6V2
R147
C78
R144
R145
R11
R12
VDYNFBC (2,6F)
R142
R143
C73
C74
C75
C76
R140
R141
W3B
W3A
K1
AT1039/01
AT4042/33A
AT4044/35
AT4042/32A
L4
L6
L5
R137
R139
R138
C67
C68
C69
R125
H-SHIFT (3,10D)
H-DRIVE (3,10F)
V40
BAW62
V42
BU 806
V41
BC547B
R126
R127
R128
R129
R131
R132
R156
R166
C61
C62
C63
C64
C65
C66
T1
V43
BUS13A
V44
BYW96E
R153
V55
BAV21
R151
R152
V54
BC547B
A (2,8F)
V19
BAV21
C35
R77
C36
R78
C34
V24
BD647
R79
V20
BAW62
V21
BAW62
V22
BAW62
R80
V25
BD648
R81
V23
BD139
R73
R74
A6A
LM1458
R75
MP7
X6.4
X6.5
AT1039/01
R82
R5
R6
R170
R53
R171
V58
BST70A
V59
BST70A
C37
1
2
3


10
1
2
3
4
5
6
7
8
9
10
HOLDDOWN (4,1A)
a
b
c
d
e
f
g
+12V
R157
3E3
HV SUPPLY (4,1B)
C48
220µ
0V
C83
100n
R111
100K
R177
1K50
R176
1K00
W7
R202
237E
C101
22n
C91
22n
475E
R178
BF240
V63
332E
R179
BC557B
V62
B (BLAD 1300-1 4c)
6K81
R180
475E
R181
D2
LM3046
R182
3K32
C92
22n
+5V
D3
LM3046
R186
100E
C102
22n
R185
1K00
C95
6,8µF
25V
A
(BLAD 1300-1 4b)
3K32
R183
3K32
R184
C103
6u8
15E
R203
R1
2K2
D4
HC 4053
X9:B2
R191
10K0
X9:A3
V BRIGHT (1 6e)
3K2
R189
15K0
R190
W8
HC4053
D4
R2
2K2
X9:B3
X10:B1
X10:A1
X10:A2
V61
LDR
W5
R188
5K11
R187
100K
LM1458
A2B
R197
68K
C104
22n
X9:A1
+15V
X9:B1
X9:A5
X9:A4
-15V
X9:B4
X9:A2
R195
2K21
R194
332E
V64
BC 547B
R196
2K21
C94
33µF
6V3
H-SHIFT (4,1D)
H-DRIVE (4,1F)

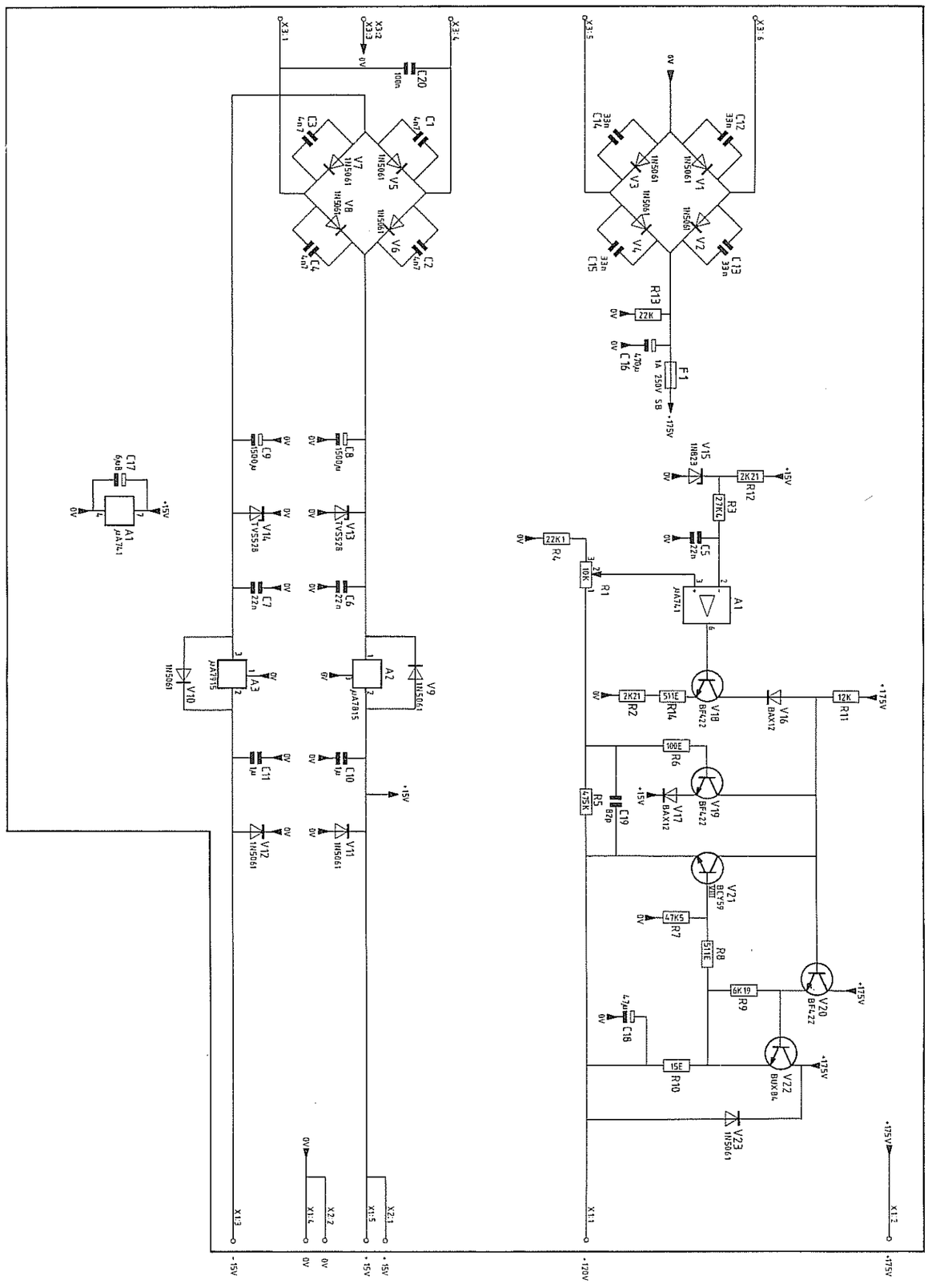


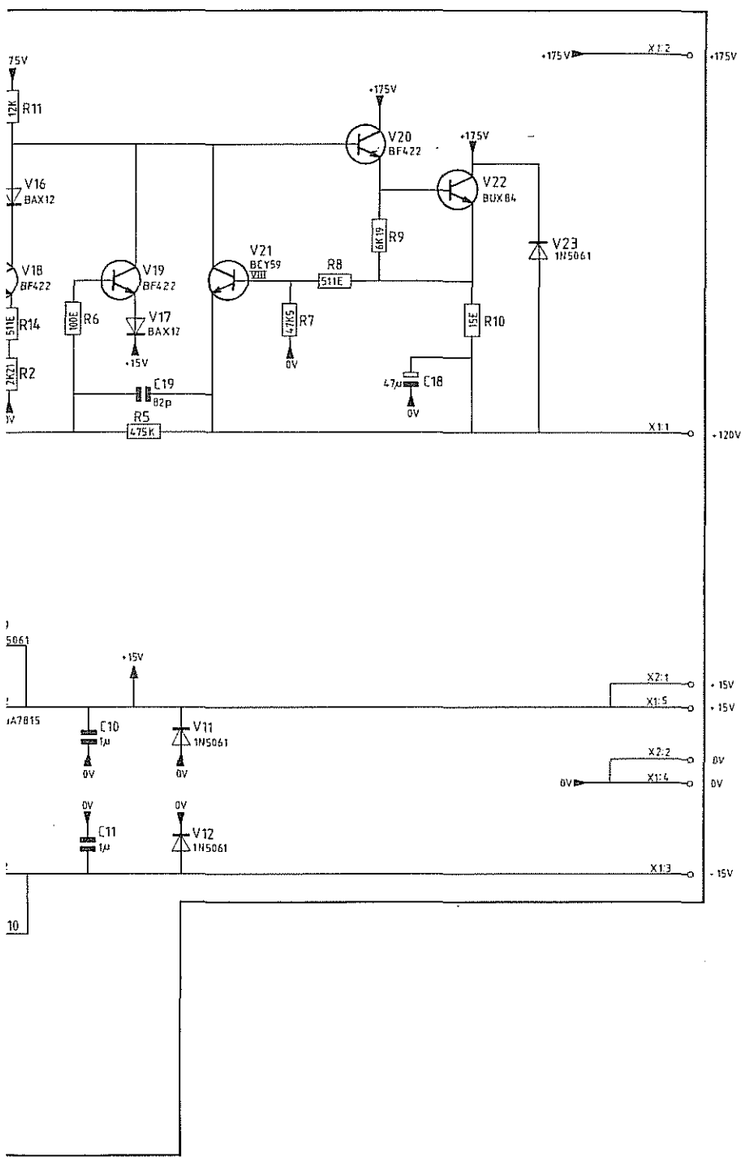


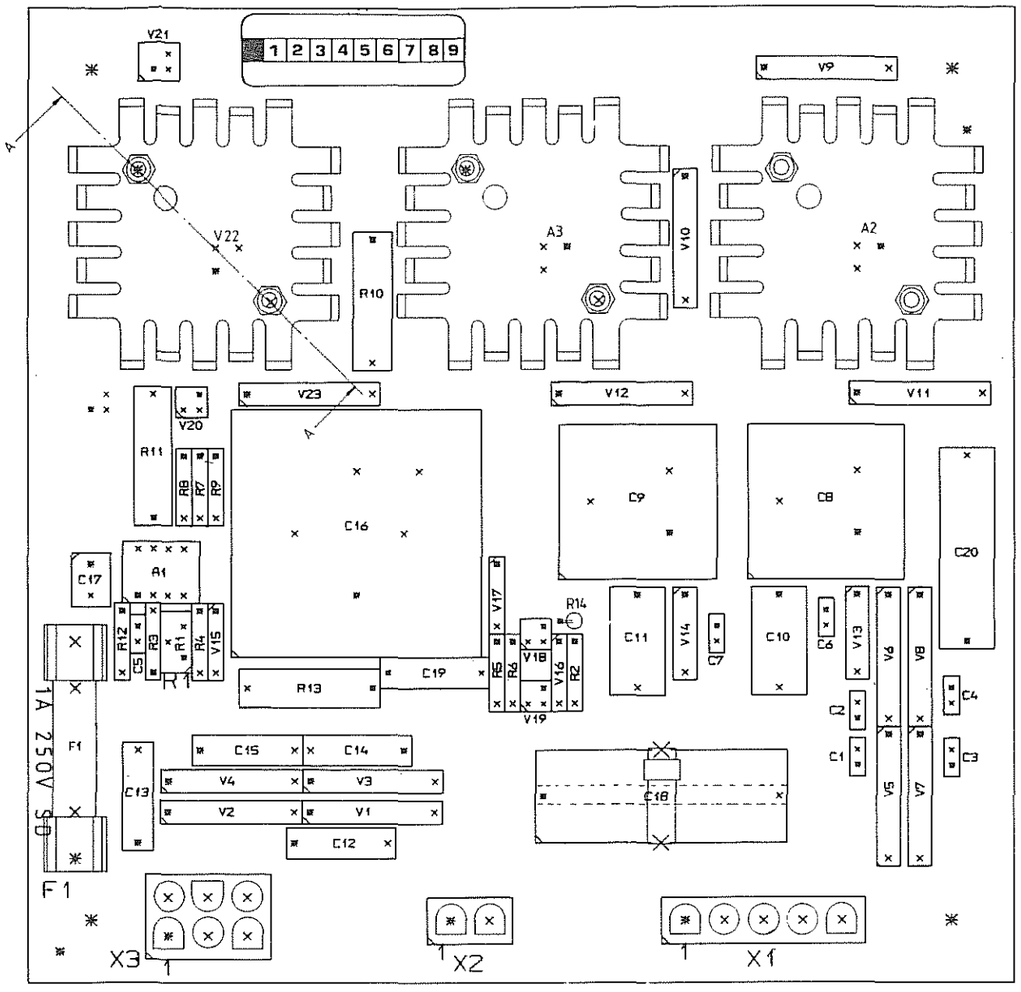
4522 108 09853 UNIT (89.0)

WM 10

BASIC 20 MON. HR 4522 108 09853	

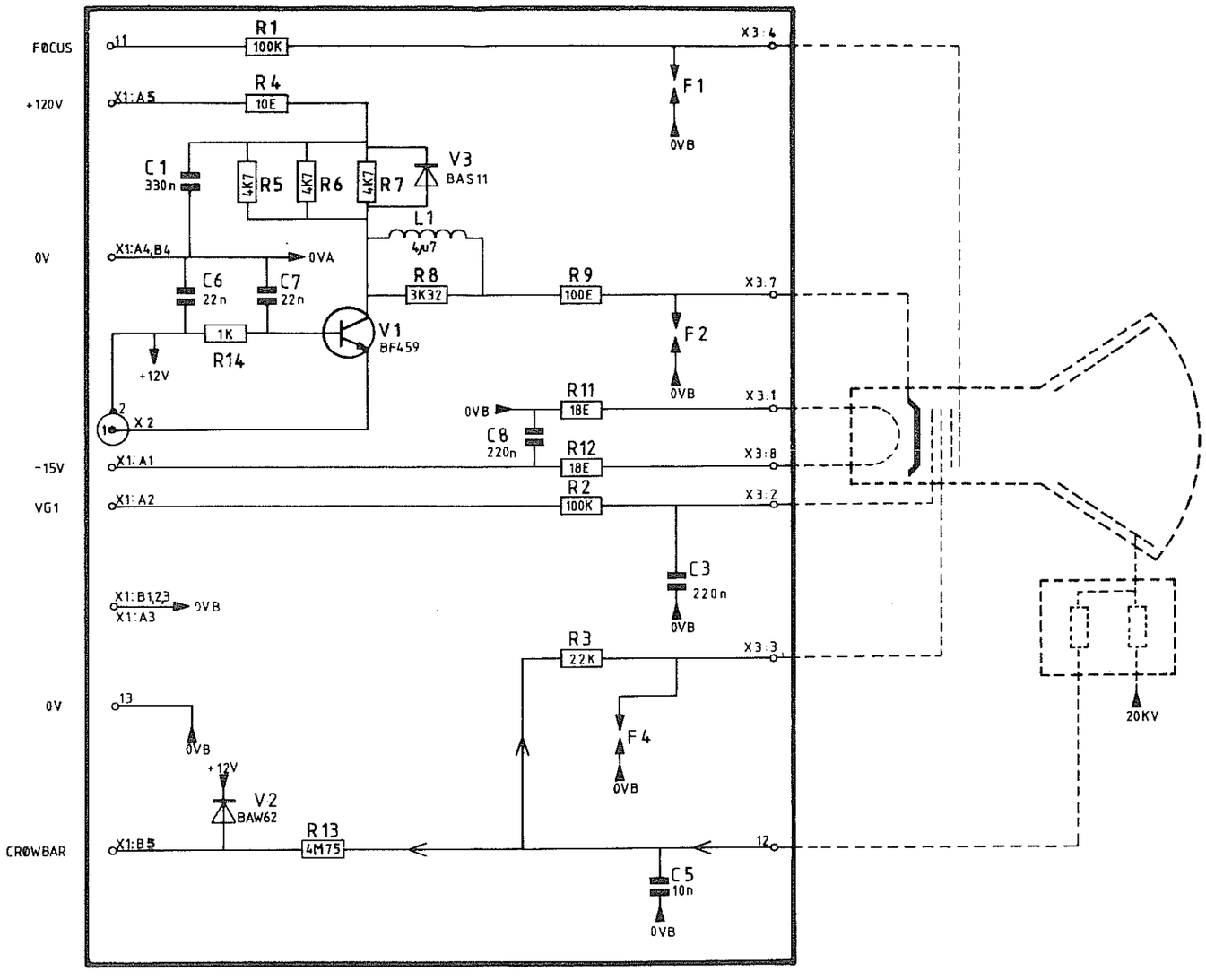

13.5VAC1
13.5VAC2
21VAC1
21VAC2
0V
X3:6
X3:5
X3:4
X3:1
X3:2
X3:3
C20 100n
C1 4n7
C2 4n7
C3 4n7
C4 4n7
V1 1N5061
V2 1N5061
V3 1N5061
V4 1N5061
V5 1N5061
V6 1N5061
V7 1N5061
V8 1N5061
C12 33n
C13 33n
C14 33n
C15 33n
R13 22K
C16 470µ
F1 1A 250V SB
+15V
V15 1NR23
2K21 R12
27K2 R3
C5 22n
22K1 R4
10K R1
A1 µA774
R2 2K21
R14 511E
V18 BF422
V16 BAX12
R11 12K
R6 100E
V19 BF422
V17 BAX12
R5 475K
C19 82p
V21 BCY59 VIII
R7 47K5
R8 511E
R9 6K19
V20 BF422
C18 47µ
R10 15E
V22 BUX84
V23 1N5061
-120V
+175V
X1:1
X1:2
C17 6n8
A1 µA7741
C9 1500µ
C8 1500µ
V14 TVS528
V13 TVS528
C7 22n
C6 22n
A3 µA7915
A2 µA7915
V10 1N5061
V9 1N5061
C11 1µ
C10 1µ
V12 1N5061
V11 1N5061
X1:3
X2:2
X1:4
X2:1
X1:5
-15V
1A 250V SB
F1
C17
C13
R12
C5
R3
R1
A
X3
V2

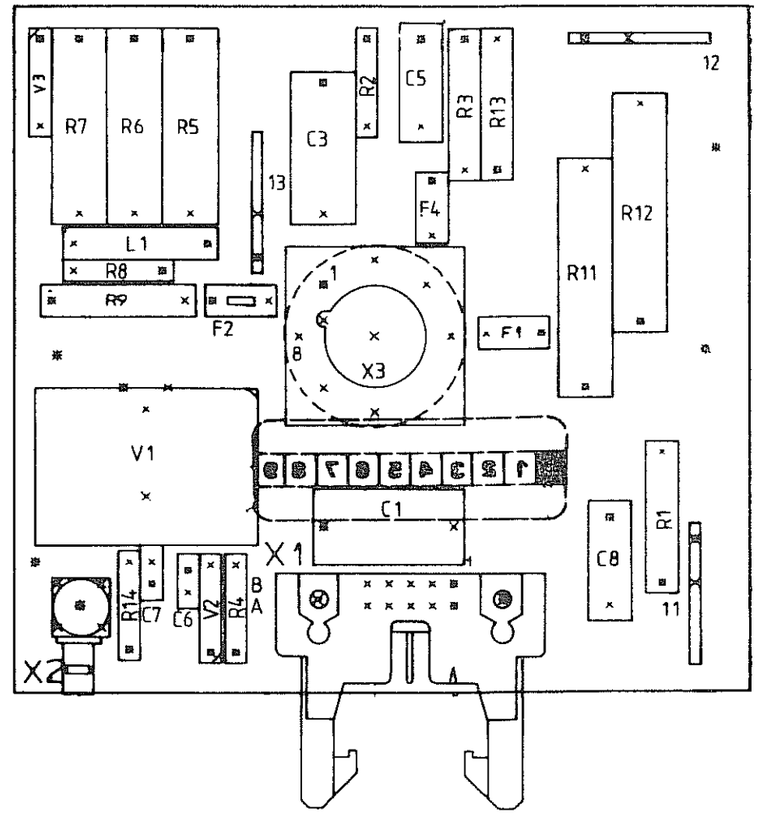




WM20

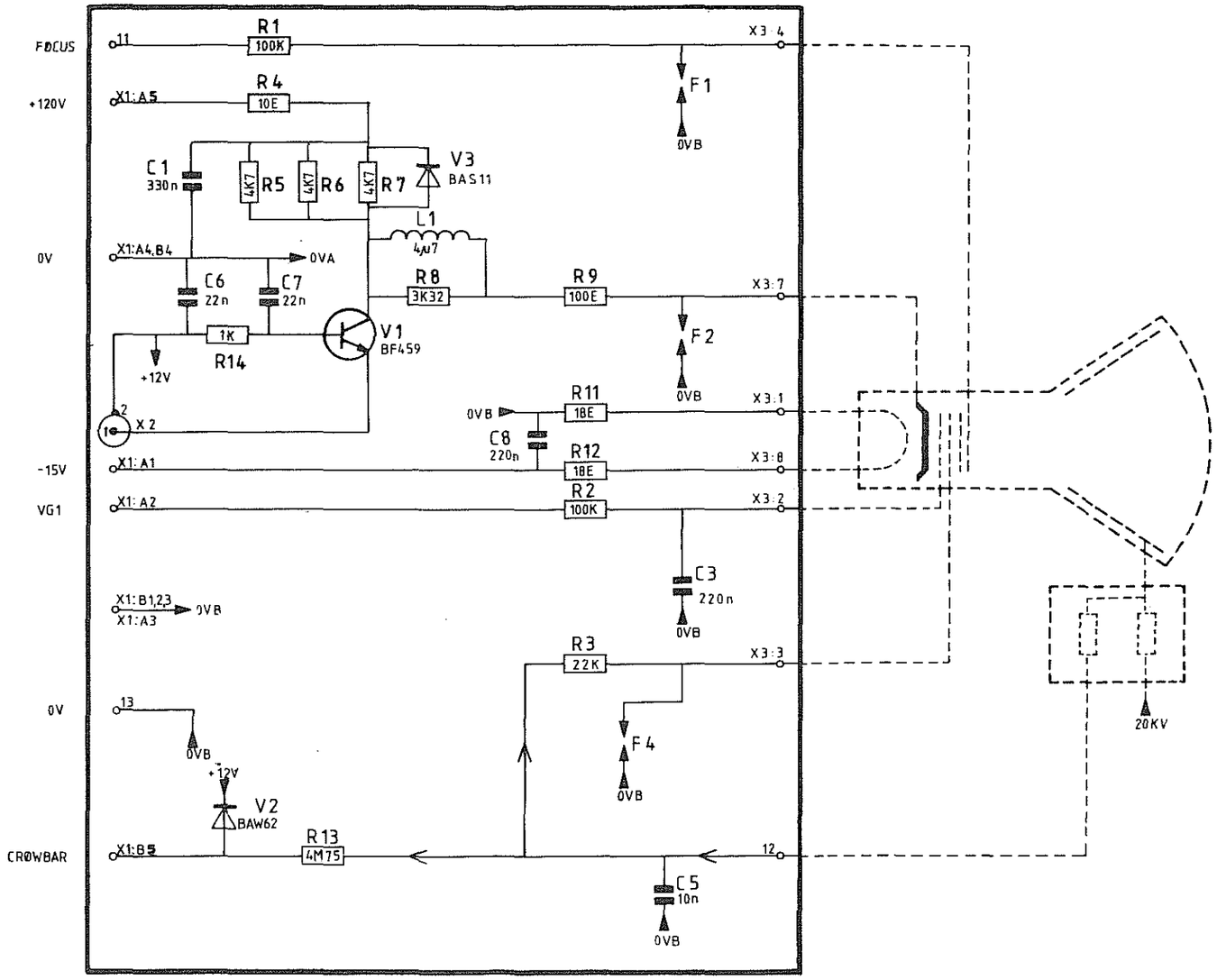
POWER SUPPLY
4522 107 87853

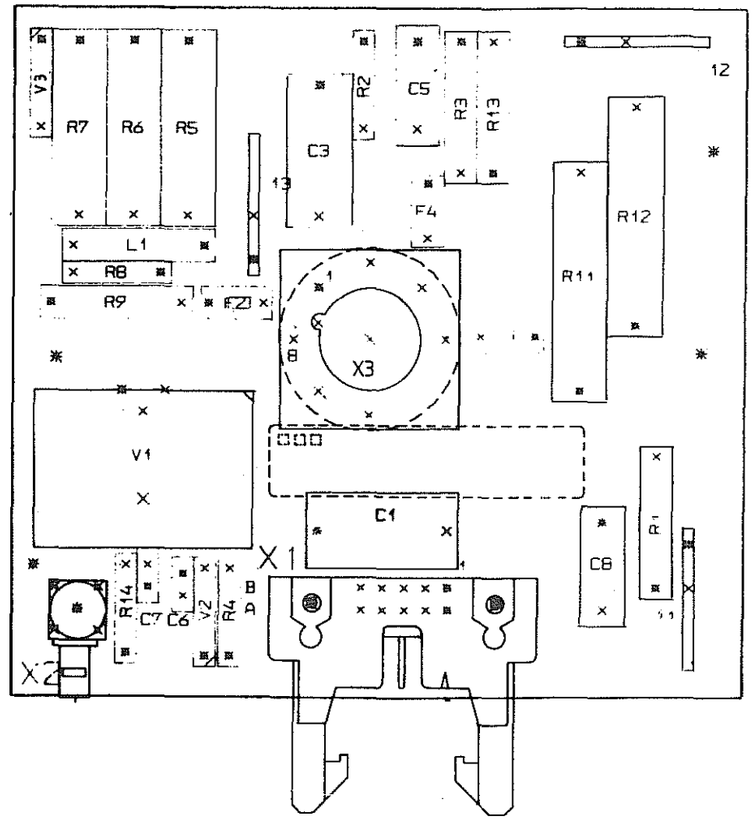




WM30

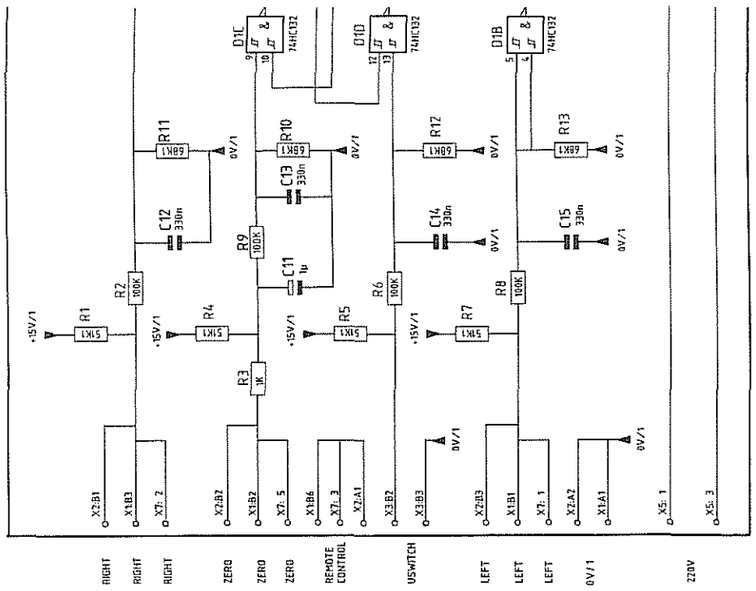
TUBE SOCKET 4522 107 87804	◇





WM30

TUBE SOCKET 4522 107 87805	


RIGHT
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RIGHT
ZERO
ZERO
ZERO
REMOTE CONTROL
USWITCH
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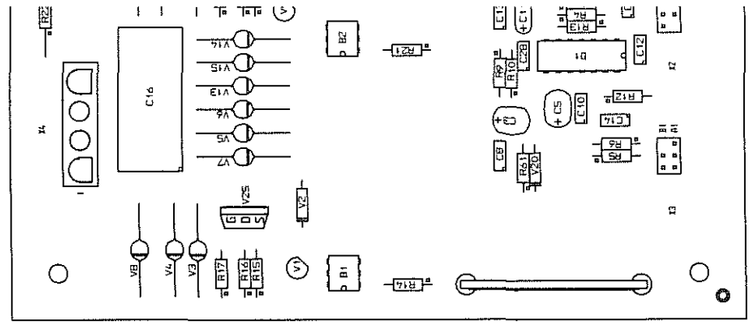
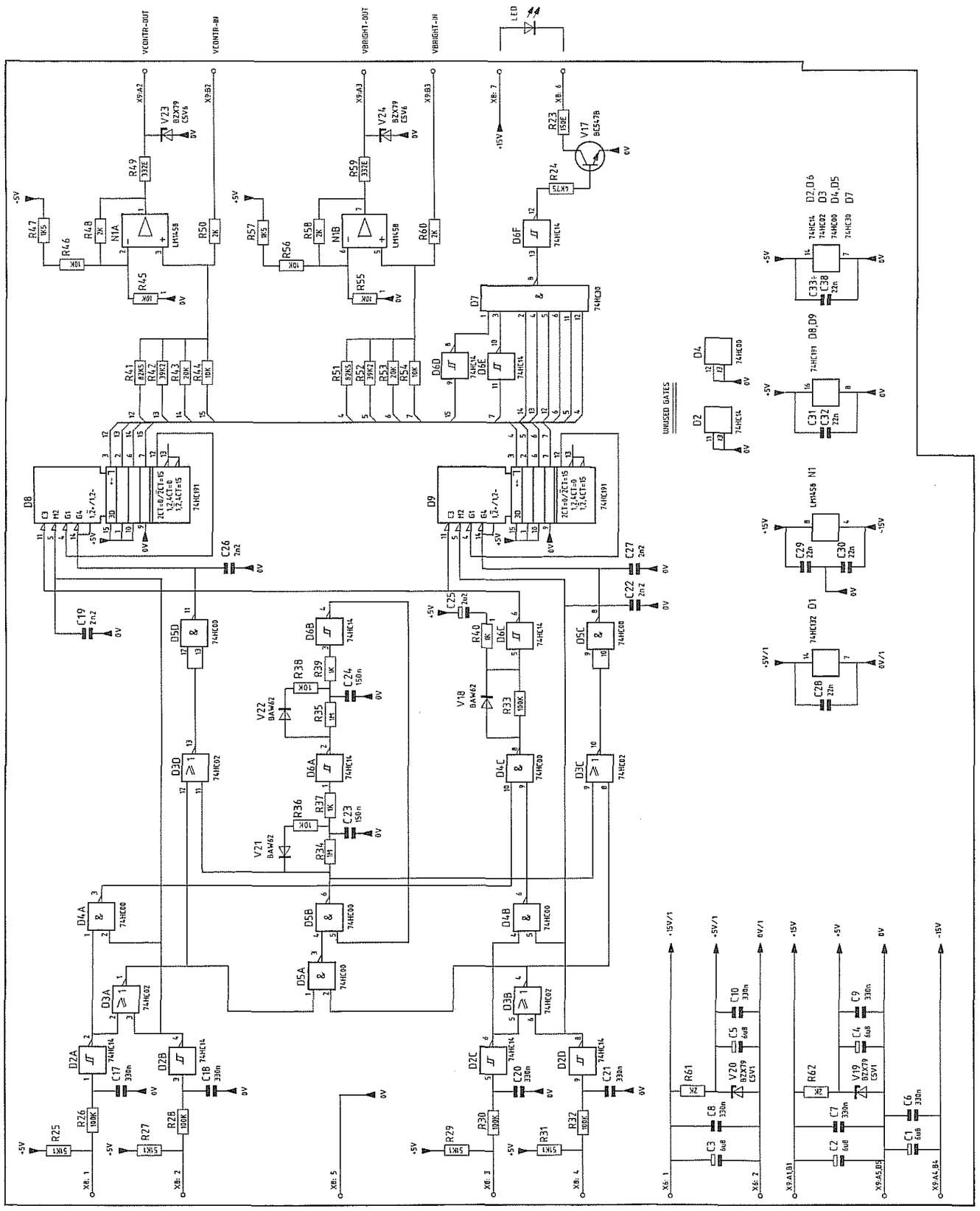
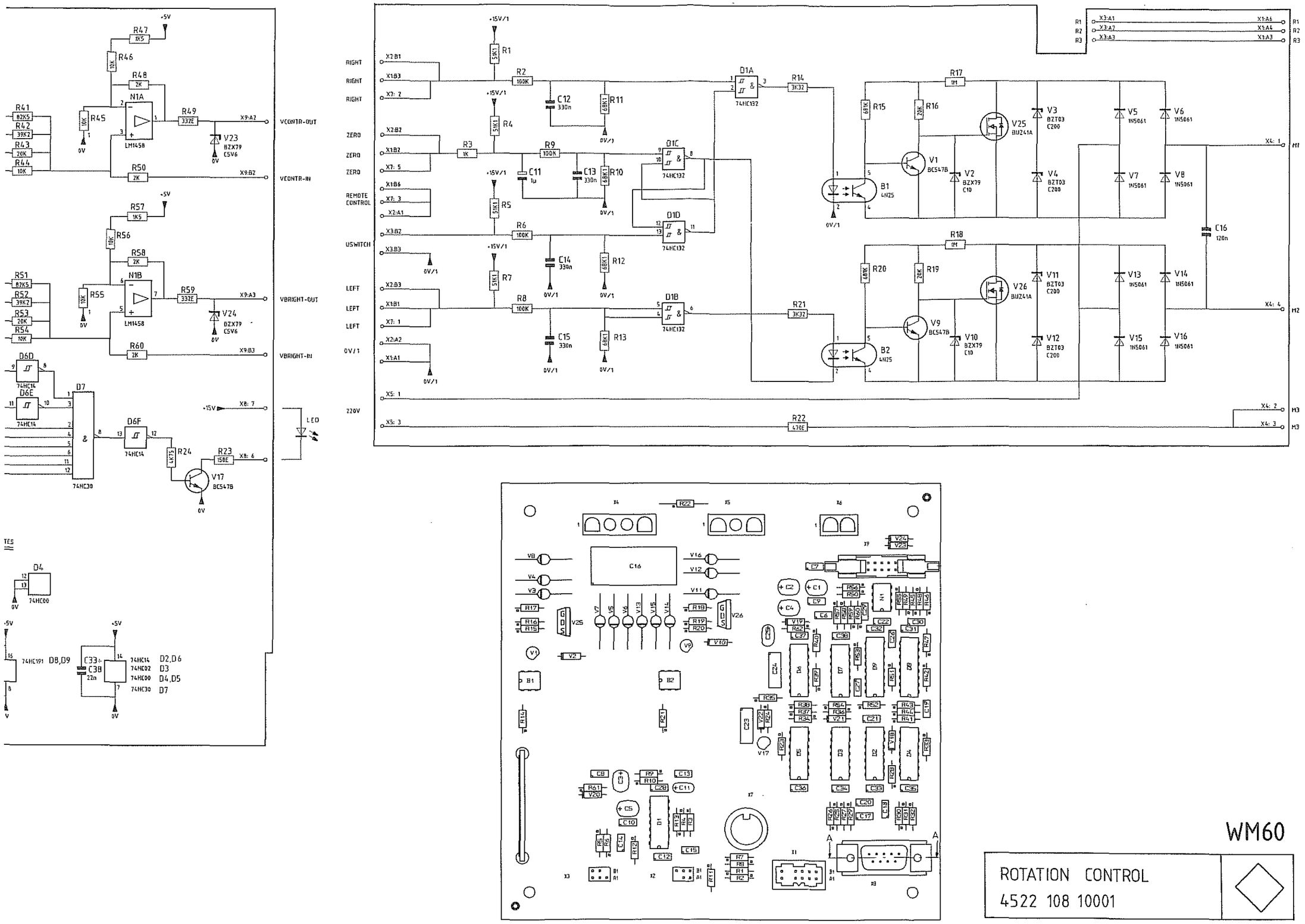
LEFT
LEFT
0V/1
220V




UP
CONTR.
DOWN
0V
UP
BRIGHTN
DOWN
-15V
0V
+15V
0V
-15V



WM60

ROTATION CONTROL
4522 108 10001

The Additional Information in this section is meant for readjusting the HM(R)20S monitor to be used with the following systems:

Tomoscan: TX all versions
CX all versions
LX all versions

including IDC and DDC for all of the above mentioned systems.

Connections to be made

1. Video-cable.
   Connect the video-cable (75 ohm) at the Tomoscan system-side to the video output of the Central Control Console or make a chain with the Multi Imager. Connect the video-cable at the monitor-side to video input X1 on the WM10 Basic board.

2. Power-cable.
   Connect the power-cable to the Power Distribution Unit, terminals U3, V3 and E. These are the 208V outlets for the CCC. The HM(R)20S monitor normally requires 220V 50Hz or 60Hz, but will give no problem when powered with 208V.

Adjustments

The HM(R)20S monitor has to be adjusted to the Tomoscan TX, CX or LX video. Adjustment procedure; see section C page CZ-1 for the location of jumpers, switches, potmeters, capacitors and coils on the WM10 Basic board of the monitor.

1. Use the SMPTE test-pattern as adjustment image (this test-pattern is delivered with the Tomoscan-system on floppy).

2. Set jumpers W1 up to W8 and switch S1 on the WM10 Basic board according to table.

Switch	Position	Funtion
WM10:S1	1-2	Terminate WM10:X1 with 75 ohm. With WM10:W4 on 1-2, WM10:X2 is suitable for parking a second video cable. (Not in case of monitor types 9807 751 50001 and 9807 751 50101).
	1-3	Loop through (WM10:X1 = WM10:X2), WM10:X1 not terminated.

Jumper	Position	Function
WM10:W1	B	Normal frame frequency
W2	B	Normal frame frequency
W3	A	3:4 Scan Ratio High Line Rate
W4	1-3	Sync. external WM10:X2 (not terminated)
W5	1-2	LDR switched off
	1-3	LDR switched on
W6	1-3	3:4 Scan Ratio High Line Rate
W7	1-2	Contrast Correction standard
	1-3	Contrast Correction low
W8	1-2	Brightness Correction on
	1-3	Brightness Correction off

NOTE: Jumpers W5, W7 and W8 to be positioned depending on application.

The video-cable coming from the Tomoscan TX-, CX- or LX-system has to be terminated by a 75 ohm resistor (only once in the whole video chain of course). This can be done internally in the HM(R)20S monitor by setting switch WM10:S1 in position 1-2 to 75 ohm termination. If an external 75 ohm terminator is used already, then set switch WM10:S1 in position 1-3 to OPEN.

3. Replace WM10:C74 (0.82/uF) by a capacitor of 1/uF (codenr. 2222 357 51105), to get an aspect ratio of 4:5 instead of 3:4.

4. Adjust the horizontal hold with WM10:R10 until the picture is as stable as possible.

5. Set jumper WM10:W4 from the 1-3 to the 1-2 position (no external sync.).

6. Fine adjust the horizontal hold, if necessary, with WM10:R10 to stabilize the picture.

7. Adjust the picture width with WM10:R201, or if not present with WM10:R7, do not overscan (don't use more than 95% of the full monitor width). Or if equipment is available adjust with WM10:R201 (or WM10:R7) high tension to 18.5 kV, measured at high tension connection to the picture tube, with high tension probe (i.e. PM9246A) and DMV (i.e. PM2518X).

8. Adjust the horizontal picture position with WM10:R9.

9. Adjust the horizontal linearity with WM10:L5.

10. Adjust the picture height with WM10:R53, if not present with WM10:R6.

11. Adjust the vertical linearity with WM10:R4.

12. Adjust the vertical picture position with WM10:R5.

13. If BRIGHTNESS pre-adjust is necessary, then:
    a. turn the CONTRAST-potmeter at the monitor front fully counter-clockwise (minimum contrast).
    b. Turn the BRIGHTNESS-potmeter at the monitor front fully clockwise (maximum brightness).
    c. pre-adjust the brightness with WM10:R14.

14. Adjust BRIGHTNESS and CONTRAST at the monitor to match the HM(R)20S monitor image as close as possible to the system monitor image.

Overview of potentiometers, capacitor and coil with the effect of their adjustment.

Potmeters	Function
WM10:R1	Contrast Adj. (Front Panel)
R2	Brightness Adj. (Front Panel)
R4	Vertical Linearity
R5	Vertical Shift
R6	Low Line Height Adj.
R7	High Line H.T. Adj. for 1:1 Scan Ratio
R8	Low Line H.T. Adj.
R9	Horizontal Shift
R10	Line (Hor.) Output Adj. (64.0 or 63.5 /usec)
R13	Centre Focus
R14	G1 Adjust (brightness pre-adjustment)
R53	High Line Height Adj. (Use R6 if R53 is not present)
R201	High Line H.T. Adj. for 3:4 Scan Ratio (Use R7 if R201 is not present)

Capacitor/Coil	Function
WM10:C17	Frequency Correction
L5	High Line Horizontal Linearity

NOTE : If the monitor shows problems in images with high contrast differences (no sharp edges), then remove zenerdiode WM10:V26. In more recent versions WM10:V26 is a diode, this one may not be removed.

4522 161 5024.
4522 161 7130.

FILING INSTRUCTIONS

This manual is part of the service documentation set for the XTV5 TV Chain.
It should be filed with the service manual for the:

BV25.

Additional binders can be ordered from IPC Eindhoven:

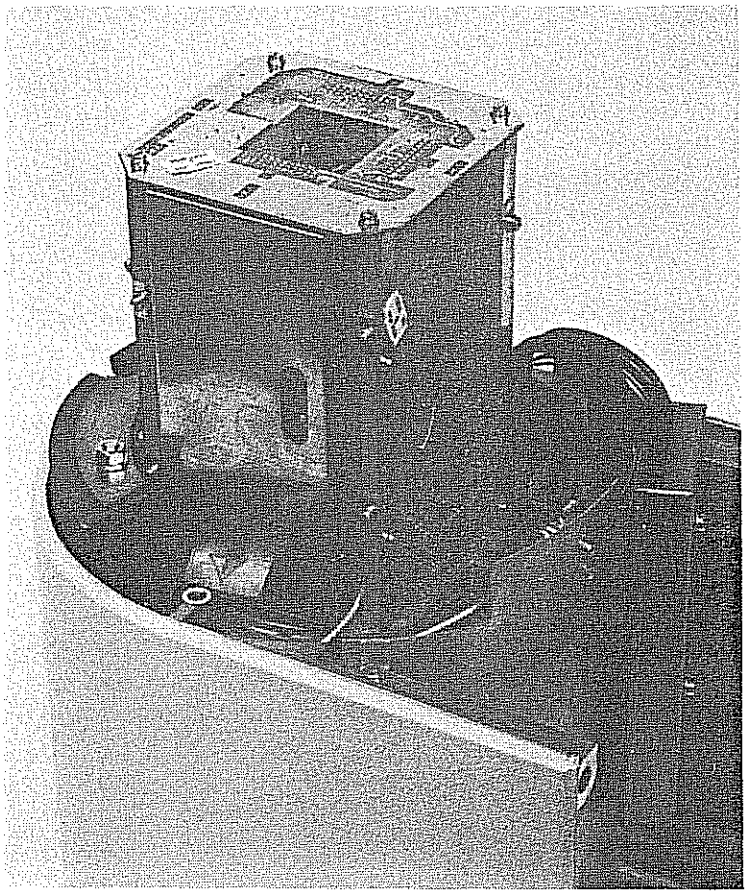
Capacity	Code Number
20 mm	4522 980 32141
26 mm	4522 980 31631
50 mm	4522 980 31641
65 mm	4522 980 31651

SERVICE MANUAL-UNIT

XTV5 Camera FB/HFB

4522 161 5024.
4522 161 7130.

For serial numbers, see list of pages and drawings



IPC: Eindhoven

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INSTALLATION B

SETTING TO WORK C

ACCEPTANCE D
Not Applicable

PREVENTIVE MAINTENANCE E

CORRECTIVE MAINTENANCE F

EXPLANATIONS G
Not Applicable

SERVICE INFORMATION N

PARTS LIST P
Not Applicable

DRAWINGS Z

ADDITIONAL INFORMATION AI

SERVICE MANUAL UNIT
XTV5 CAMERA FB/HFB
TYPE NR. : 4522 161 5024. / 4522 161 7130.

SERIAL NR. :

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B-4	(83.0)E	Z3-3	(89.0)	4522 107 71358
		Z3-4	(86.0)	4522 107 71411
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C-2	(83.0)E	Z3-4	(87.0)	4522 108 07751
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C-7	(83.0)E			
C-8	(83.0)E			
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F-12	(83.0)E			
F-13	(83.0)E			
F-14	(83.0)E			
F-15	(83.0)E			
F-16	(83.0)E			
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3.1.3. Preamplifier Board WK2 A-1
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LIST OF DRAWINGS

1. 4522 161 5024. ITEMS SUPPLIED AZ-1

1. PURPOSE

The XTV5 Camera FB/HFB is used in fluoroscopy systems to receive, to convert and to control electronic signals to and from a camera image tube.

2. VERSIONS

There are no versions of this camera to date.

3. ITEMS SUPPLIED (Figure AZ-1)

- XTV5 Camera FB/HFB

3.1. EQUIPMENT ITEMS

3.1.1. Deflection and Focus Coil Assembly

Contains horizontal and vertical deflection coils, a focus coil, and alignment coils.

3.1.2. Vertical Deflection Board WK1

Generates a vertical sawtooth current for the vertical deflection coils; cathode and G1 control voltages; and directs filement voltage to WK6.

3.1.3. Preamplifier Board WK2

Converts signal current from the camera image tube into a video voltage, which is then amplified, clamped and blanked.

3.1.4. Horizontal Deflection Board WK3

Generates a horizontal sawtooth current for the horizontal defelection coils, and alignment control voltages.

3.1.5. High Voltage Board WK5

Generates voltages for the camera image tube grids G2, G3, and G4 for the High Voltage Detector Indicator Lamps at WK1(HVHI) and (HVLO); and a Va Adjust Signal for WK2.

3.1.6. Back Panel Board WK5

Contains interface components and a camera image tube-type select switch.

3.1.7. Tube Interface Board WK6

Receives and dierect electrical supplies for the camera image tube.

3.1.8. Mechanical Sections

Comprise a cap, centering rings, image tube tension springs, and pressure assembly with image tube adaptor pieces.

3.2. CABLE SET

No cable set has been supplied with XTV5 Camera FB/HFB.
The cables and cable connections are described in the BV25 level documentation.

3.3. MOUNTING HARDWARE AND SMALL PARTS (AZ-3)

4. TECHNICAL DATA

4.1. PERFORMANCE DATA

4.1.1. Performance Specifications

INPUT POWER	+15V ± 5% (max. 350mA); -15V ± 5% (max. 600 mA) +6.4V ± 5% (max 350mA); 0V Return 200mA Short time stability 0.3% Ripple ± 100 mV.
BANDWIDTH	25 MHz (-3dB) flat within 1dB, 1-15MHz (ref. 1MHz) l.f. drop at 250Hz 4% l.f. drop at 50Hz 10%
IMAGE TUBE	1" diameter 6" length, separate mesh, magnetic deflection, focus, and alignment
IMAGE TUBE VOLTAGES	G1 - 0 to -110V ± 10V G2 - +300V ± 5% G3 - +600V ± 5% G4 - +120V ± 5% Filament- +6.9V ± 5% Va - max. +75V ± 5%
BLANKING	Max. $100V_{pp}$ total blanking at G1.
SCAN FAILTURE PROTECTION	In the event of horizontal or vertical scan failture, the scanning beam in the camera image tube is immediately turned off.
BEAM CURRENT SUPPRESSION	Beam current is suppressed during flyback through G1 blanking and 15 sec $+100\ -0$ % after switch on.
CAMERA VIDEO OUTPUT	Non-composite with positive 2 ± 0.4mV$_{pp}$/nA$_{pp}$ as measured across 75Ω ±1% source
SIGNAL CURRENT	*Adjusted to max. 600 nA$_{pp}$*
OUTPUT SOURCE IMPEDANCE	75 Ω ± 5%.
SIGNAL TO NOISE RATIO	≥ 38dB with signal current of 300 nA with a 10MHz low-pass filter.
TARGET NEGATIVE *PROTECTION*	The potential of the cathode *of the camera image tube can be* lifted to a pre-adjusted value (0-4V).
REMOTE CONTROL FUNCTIONS	Horizontal Image Reversal Beam Current Suppression Target Negative Protection
LENS	Rodenstock 1,1/50; spring-loaded fixed coupling between lens and camera image tube.

4.1.2. Input and Output Specifications

4.1.2.1. Vertical Deflection Board WK1

INPUTS Supply Voltages	+15V ± 0.1V	-15V ± 0.1V	0V	+6.4V ±0.1V
Measuring points	X1:B10	X1:B5	X1:A6	X1:B1

Combination Pulse — See Chart 1
Measuring point — X1:B3

Interruption — +6V ± 0.1V or 0V ± 0.1V ("1" or "0")
Measuring point — X1:A10, X1:A8

Start Circuit — +6V ± 0.1V or 0V ± 0.1V ("1" or "0")
Measuring point — X1:A7

Vertical amplitude — -10V ± 0.1V to +10V ± 0.1V
Measuring points — X1:A5, X1:A9

Vg Adjust — 0V to -10V ± 0.1V
Measuring point — X1:B7

4.1.2.1. Vertical Deflection Board WK1 (Cont.)

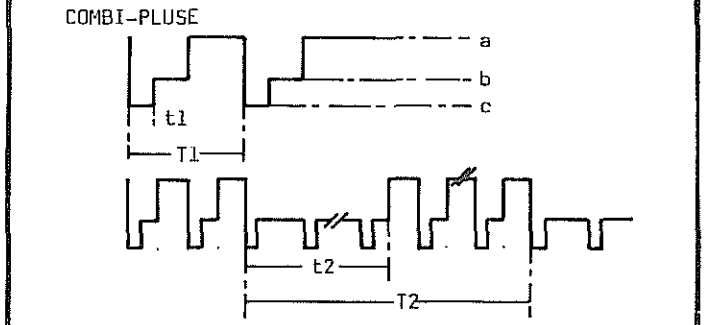
Target Negative Protection	-10V ± 0.1V to +10V ± 0.1V
Measuring point	X1:B9
Vertical Shift	0V ± 0.1V to +10V ± 0.1V
Measuring point	X1:B8
High Voltage Detection	-10V ± 0.1V or ± 10V ± 0.1V via resistor of 1 KΩ ± 10%
Measuring point	X1:B6
-115V Supply	-115V ± 1V
Measuring Point	X1:A2

OUTPUTS

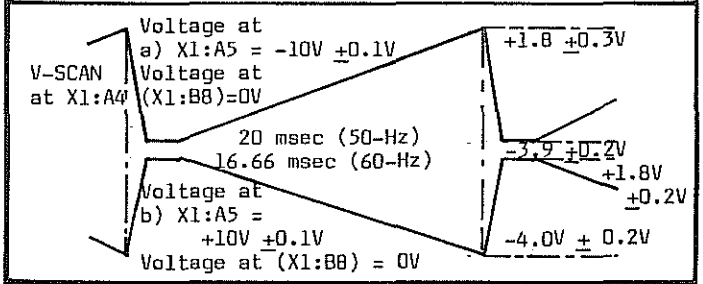
Supply Voltages	+15V ± 0.1V	+ 6.4V ± 0.1V	-15V ± 0.1V	0V
Measuring points	X2:A1	X2:B6	X2:B3	X2:B9

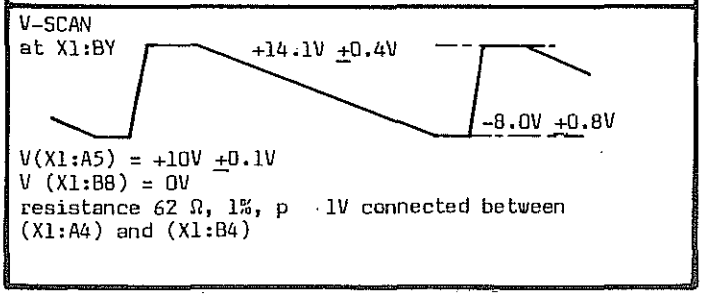
G1 Voltage	-114.5V ± 1.5V
Measuring point	X2:A10
Cathode Voltage	-V (X1:B9) ± 3%
Measuring point	X2:B5
V-Scan	See Chart 1
Measuring points	X1:A4; X1:B4

CHART 1: WK1 WAVEFORMS



a = +5.5V ±0.2V
b = +2 ±0.2V
c = -0.7V ±0.2V
t1 = 6 µsec (50-Hz); 7 µsec (60-Hz)
T1 = 32 µsec
t2 = 1.6 msec (50-Hz); 1.28 msec (60-Hz)
T2 = 16.6 msec (60-Hz)





V(X1:A5) = +10V ±0.1V
V (X1:B8) = 0V
resistance 62 Ω, 1%, p 1V connected between (X1:A4) and (X1:B4)

4.1.2.2. Preamplifier Board WK2

INPUTS

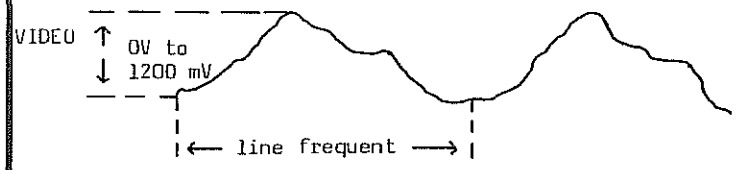
Supply Voltages	+15V ±5%	0V	-15V ±5%
Measuring points	X1:B5 X1:A5	X1:B1 X1:A1	X1:B3 X1:A3

Target Current	0 - 650 mA top to top
Measuring point	---
Va Adjust	0V to +80V ± 5%
Measuring point	X1:A10, X1:B10

OUTPUT

Video	See Chart 2
Measuring point	Vas

CHART 2: WK2 WAVEFORMS



4.1.2.3. Horizontal Deflection Board WK3

INPUTS

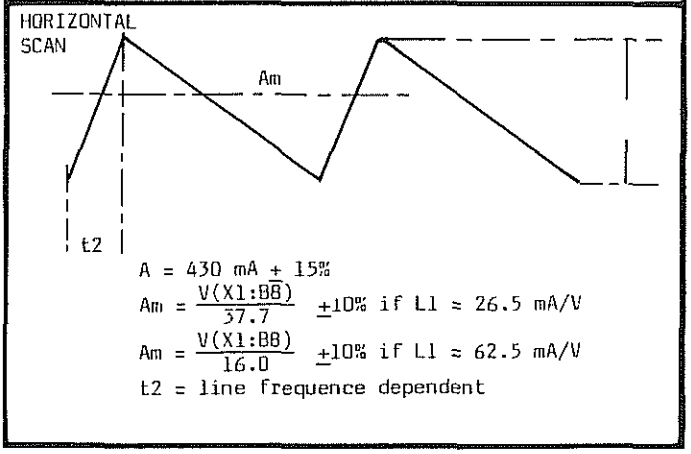
Supply Voltages	+15V ±0.1V	+6.4V ±0.1V	0V	-15V ±0.1V
Measuring points	X1:A10	X1:B9	X1:A3	X1:A7

Combination Pulse	See Chart 1		
Measuring point	X2:A5		
Alignment Control	1	2	} +10V ±0.1V to
Measuring points	X1:B1	X1:B3	} -10V ±0.1V
Static Focus	81-94 mA to 148 - 179 mA		
Measuring point:	X1:A2		
H-Scan Reverse	+15V ±0.1V or 0V ± 0.1V		
Measuring point	X1:B6		
H-Shift	+1V ±0.1V to -1V ± 0.1V		
Measuring point	X1:B8		
H-Amplitude	-15V ±0.1V to +5V ± 0.1V		
Measuring point	X1:B4		
V-Scan	See Chart 1		
Measuring points	X1:B2, X1:A1		

OUTPUTS

Static Focus	81-94 mA to 148-179 mA	
Measuring points	X2:B3	
+6.4V Focus Coil	+6.4V ± 0.1V	
Measuring point	X2:A3	
Alignment 1	V(X2:A2) = V(X1:B1) ±5%	0.45V(X1:B3 ±5%)
Measuring points	X2:A2 when connected to	X2:B2
Alignment 2	V(X1:B3) ±5%	0.45V(X1:B3) ±5%
Measuring points	X2:A1 when connected to	X2:B1
Horizontal Scan	See Chart 3	
Measuring points	X2:B7; X2:A5	
Interruption	+5.4V ±0.5V when -7V ±1.0V at (X1:B4)	
Measuring point	X1:B5	
Short Circuit	+6V ± 0.1V or 0V ± 0.1V ("1" or "0")	
Measuring points	X2:B10; X2:A10	
HT Pulse	See Chart 4	
Measuring point	X1:A6	

CHART 3: WK3 WAVEFORMS



A = 430 mA ± 15%

$Am = \frac{V(X1:B8)}{37.7}$ ±10% if L1 ≈ 26.5 mA/V

$Am = \frac{V(X1:B8)}{16.0}$ ±10% if L1 ≈ 62.5 mA/V

t2 = line frequence dependent

4.1.2.4. High Voltage Board WK4

INPUTS

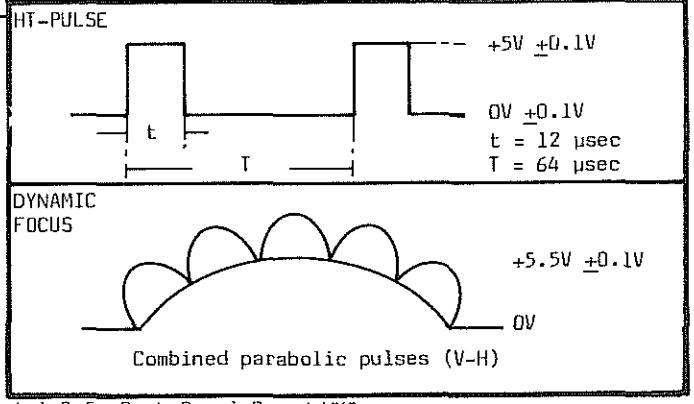
Supply Voltages	+15V ±0.1V	0V	-15V ±0.1V
Measuring Points	X1:B1	X1:A1	X1:B8
Dynamic Focus	See Chart 4		
Measuring point	X1:B3		
HT Pulse	See Chart 4		
Measruting point	X1:B4		
Va Adjust	0V to +5V ±0.1V		
Measuring point	X1:B7		

OUTPUTS

Supply Voltages	0V	+920V ± 5%	+600V ±5% + Vac M52 ± 5%	+300V ± 5%	-100V ± 7V
Measuring points	X2:B10	X2:A1	X2:B4	X2:B7	X1:A10

High Voltage Detector	0V ± 0.7V
Measuring point	X1:B2
Va Adjust	20.5V(X1:B7) ±5%, limited to 83V ±5%
Measuring point	X2:A9

CHART 4: WK4 WAVEFORMS



4.1.2.5. Back Panel Board WK5

INPUTS

Supply Voltages	+15V	+6.4V	0V	-15V	-115V
Measuring points	X5:B2	X5:B2	X5:B5 X5:B3 X5:B1 X4:A5 X4:A6	X4:B6	X1:A2

Static Focus	81-94mA to 148-179 mA		
Measuring point	X4:A3		
Alignment Control	1	2	$-9V^{+0}_{-1.9V}$ to $+8.5V^{+2.2V}_{-0}$
Measuring points	X4:B2	X4:B3	
H-Scan Reverse	0V to ± 15V (± 10%) Active when low		
Measuring point	X4:B5		
H-Shift	-9.5V ± 0.7V to +9.3V ± 1V		
Measuring point	X4:B6		
H-Amplitude	0.9 mA to 150-185 mA		
Measuring point	X4:B4		
Combination pulse	See Chart 1		
Measuring point	X4:A1		
V-Amplitude	-10V ± 0.1V to +10V ± 0.1V		
Measuring points	X5:A4; X5:A3		
V-Shift	0V ± 0.1V to +10V ± 0.1V		
Measuring point	X5:A5		
Interruption	+6V ± 0.1V or 0V ± 0.1V ("1" or "0")		
Measuring points	X1:A10, X1:A8		
Short Circuit	+6V ± 0.1V or 0V ± 0.1V ("1" or "0")		
Measuring points	X1:A7		

4.1.2.5. Back Panel Board WK5 (Cont.)

INPUTS (Cont.)

Vg Adjust: 0V to -10V ± 0.1V
Measuring point: X4:A2

High Voltage Detector: -10V ±10V ± 0V via 1kΩ ± 10% resistor
Measuring point: X3:B2

OUTPUTS

Supply Voltages	+15V	0V	-15V	-115V
Measuring points	X3:B1	X3:A1	X3:B8	X1:A2

Static Focus: 81-94 mA to 148-179 mA
Measuring point: X2:A2

Alignment Control: 1 2 } See 4.1.2.3.
Measuring points: X2:B1 X2:B3 }

H-Scan Reverse: 0V to +15V (± 10%) Active when low
Measuring point: X2:B6

H-Shift: -9.5V ± 0.7V to +9.3V ± 1V
Measuring point: X2:B8

H-Amplitude: 0-9mA to 150-185 mA
Measuring point: X2:B4

Combination Pulse: See Chart 1
Measuring point: X2:A5, X1:B3

V-Amplitude
Measuring points: X1:A5, X1:A9

V-Shift: 0V ± 0.1V to +10V ± 0.1V
Measuring point: X1:B8

Vg-Adjust: 0V to -10V ± 0.1V
Measuring point: X1:B7

Target Negative Protection: -10V ± 0.1V to +10V ± 0.1V
Measuring point: X1:B9

Dynamic Focus: See Chart 4
Measuring Point: X3:B3

HT Pulse: See Chart 4
Measuring point: X2:A6

V-Scan: See Chart 1
Measuring point: X2:A6

Va Adjust: 0V to 80V ± 5%
Measuring point: X3:B7

High Voltage Detector: -10V ± 0.1V or ± 10V ± 0V via 1k Ω± 10% resistor
Measuring Point: X1:B6
Interruption: +6V ± 0.1V or 0V ± 0.1V ("1" or "0")
Measuring point: X2:B5

Short Circuit: +6V ± 0.1V or 0V ± 0.1V ("1" or "0")
Measuring point: X2:A4

4.1.2.6. Tube Interface Board WK6

INPUTS

Supply Voltages	+15V +0.1V	0V	+6.4V ±0.1V	-15V ±0.1V
Measuring points	X2:A1	X2:B9 X2:B10	X2:B6	X2:B3

Supply Voltages	+920V ±5%	+600V ±5%	+300V ±5%
Measuring points	X1:A1	X1:B4	X1:B7

G1 Voltage: -114.5V ±1.5V
Measuring point: X2:A10

Target Negative Prevention: -10V ± 0.1V to +10V ± 0.1V
Measuring point: X2:B5

Va Adjust: 0V to 80V ± 5%
Measuring points: X3:B10; X3:A10

OUTPUTS

Supply Voltages	+15V ±0.1V	0V	-15V ±0.1V
Measuring points	X3:B5 X3:A5	X3:B1 X3:A1	X3:B3 X3:A3

Supply Voltages	+920V ±5%	+600V ±5%	+300V ±5%
Measuring points	3	6	5

G1 Voltage: -114.5V ± 1.5V
Measuring point: 2

Cathode Supply: -V(WK1X1:1:B9) ±3%
Measuring point: 7

Filament Supply: +6.4V ±0.1V
Measuring point: 8, 7

Va Adjust: 20.5V (WK4X1:B7) ±5%, limited to 83V ±5%
Measuring point: X1:A9

CAUTION

Handle the camera with usual care. Since the camera image tube in the camera is a Vidicon, it can be irreversible damaged by exposure to direct rays of the sun or other source of intense illumination.

TABLE A1 CAMERA CABLE PLUG CONNECTIONS WKX1

POINTS	FUNCTION
A	0V
B	H-SHIFT
C	COMBINATION PULSE
D	0V
E	H-SCAN REVERSE
F	+6.4V SUPPLY
G	---
H	+15V SUPPLY
J	Va ADJUST
K	V-SHIFT
L	0V
M	DYNAMIC FOCUS
N	Vg ADJUST
P	V-AMPLITUDE
R	H-AMPLITUDe
S	TARGET NEGATIVE PREVEN.
T	V-AMPLITUDE
U	STATIC FOCUS
V	ALIGNMENT CONTROL 1
W	-15V SUPPLY
X	ALIGNMENT CONTROL 2
AA	0V
MM	0V

Section B: INSTALLATION

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3. PURPOSE OF MOUNTING MATERIAL B-1

4. INSTALLATION INSTRUCTIONS B-1

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5.1. CAMERA IMAGE TUBE-TYPE MECHANICAL ADAPTATION B-2

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LIST OF DRAWINGS

1. CAMERA IMAGE TUBE REMOVAL BZ-1

2. CAMERA IMAGE TUBE INSTALLATION BZ-2

1. INTRODUCTION

This section contains instructions for installation, for camera tube removal and replacement, and for programming the XTV5 Camera FB/HFB.

2. TOOLS AND TEST EQUIPMENT

A standard tool set is required to install the XTV5 Camera FB/HFB.

3. PURPOSE OF MOUNTING MATERIAL

The purpose of any mounting material supplied with the XTV5 Camera FB/HFB is to ensure the camera and/or camera cable at a relevant location.

4. INSTALLATION INSTRUCTIONS

4.1. INITIAL CONDITIONS

(1) Before installing the XTV5 Camera FB/HFB, check that the programming requirements have been accomplished in accordance with paragraph 5, PROGRAMMING FACILITIES, of this section.

4.2. INSTALLATION MATERIAL

In order to properly mount the fiber-coupled camera 4522 161 5024. special optical oil and lens paper are needed.

Optical oil can be ordered under code number 4522 980 18001 Lens paper can be ordered under code number 4522 980 16441
from: N.V. PHILIPS GLOEILAMPENFABRIEKEN
Medical Systems Division
Service Material Management
Building QM
Eindhoven/Best
The Netherlands

No other optical installation material is required.

4.3. CAMERA IMAGE TUBE REMOVAL (Figure BZ-1)

(1) Loosen and remove the three mounting screws. Remove the camera cap.

(2) Disconnect both the camera cable plug WKX4 and the BNC plug.

(3) Holding the vertical deflection board WK1 secure, loosen and remove the four mounting screws and washers.

(4) Carefully remove the vertical deflection board WK1.

(5) Loosen the three camera mounting screws, and gently lift the camera tube socket up - away from the camera tube pins so that the socket merely rests upon the image tube.

4.3. CAMERA IMAGE TUBE REMOVAL (Figure BZ-1) (Cont.)

(6) Gently lift the camera away, and carefully remove the screws holding the pressure and centering rings in place.

(7) Rotate the camera image tube a quarter-turn, and lift the camera image tube-upright-away from the image intensifier.

4.4. FIBER OPTICS CLEANING

CAUTION

Observe the following cautions to avoid damaging the fiber optics:

(a) Only use the lens paper supplied: do not use silicon-treated paper.
(b) Use a sheet of lens paper only once.
(c) Do not wipe fiber optics clean with a circular motion.
(d) Do not moisten or blow on the fiber optics.

(1) If the camera image tube or image intensifier is new, remove the protective cover.

(2) Clean the camera image tube with the lens supplied, moving the lens paper across the fiber optics in one direction only.

NOTE

If the cleaning has been done with alcohol, allow the alcohol to evaporate completely.

CAUTION

If the camera image tube is a Vidicon, it can be irreversably damaged by exposure to the direct rays of the sun or any other source of intense illumination.

4.5. CAMERA IMAGE TUBE REPLACEMENT (Figure BZ-2)

CAUTION

Before beginning, vertically position the image intensifier. With a lamp, carefully check that all dust particles have been removed from the image intensifier and Vidicon Camera image tube.

(1) Slide the centering ring over the camera image tube. Align the white mark on the camera image tube with the single groove on the pressure ring.

NOTE

In case of interference (scanning, mesh, fiber), align the white mark on the camera image tube with the double grooves on the pressure ring.

4.5. CAMERA IMAGE TUBE REPLACEMENT (Figure BZ-2) (Cont.)

(2) Apply a drop of optical oil to the center of the image intensifier with the wire applicator in the top of the oil bottle.
Check that the camera image tube is still aligned and that the target wire is correctly positioned. Press the camera image tube and centering and pressure rings on the image intensifier and secure.

CAUTION

Do not lift the camera image tube to re-align; turn only.

(3) Carefully lower the camera over the camera image tube.

(4) Press the camera tube socket onto the camera image tube socket pins.

CAUTION

Check that the pins of the socket are properly aligned. Do not twist the camera image tube.

(5) Replace and tighten the three camera mounting screws; replace the vertical deflection board WK1; reconnect the camera plug WKX4 and the BNC plug.

(6) Replace and secure the camera cap with the three mounting screws.

5. PROGRAMMING FACILITIES

This paragraph describes the conditions which must be met before installing the XTV5 Camera FB/HFB. Positions of controls and adjustments are described in Section C, SETTING TO WORK.

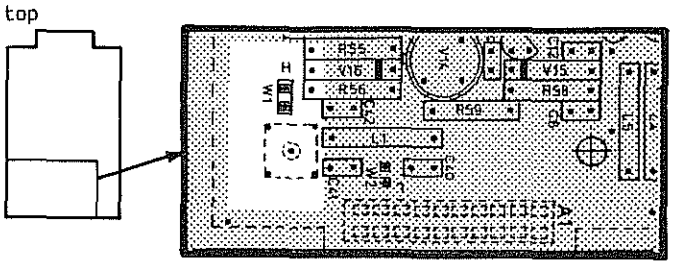
5.1. CAMERA IMAGE TUBE-TYPE MECHANICAL ADAPTATION

(1) If a Plumbicon camera image tube is to be installed, check that the proper adaptor (See Figure BZ-3) is in place.

(2) If a Vidicon camera image tube is to be installed, check that the proper adaptor (See Figure BZ-3) is in place.

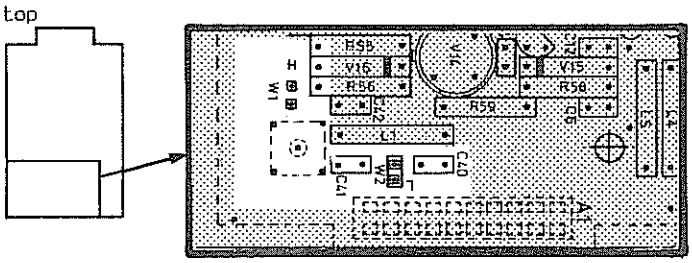
5.2. VIDEO PREAMPLIFIER BOARD WK2

(1) For an XTV5 HFB System position jumper W1 at H as shown on this page. Remove W2.



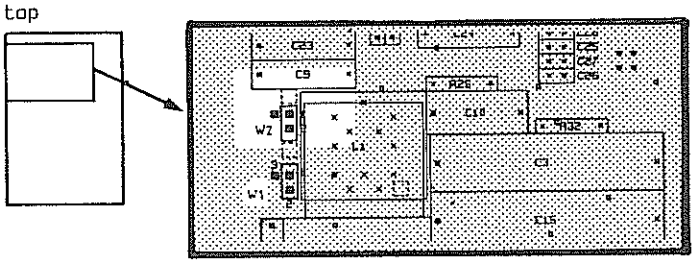
5.2. VIDEO PREAMPLIFIER BOARD WK2 (Cont.)

(2) For an XTV5 SF or FB System position jumper W2, as shown below, at L. Remove W1.

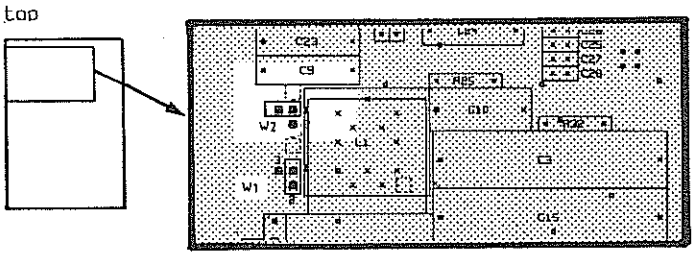


5.3. HORIZONTAL DEFLECTION BOARD WK3

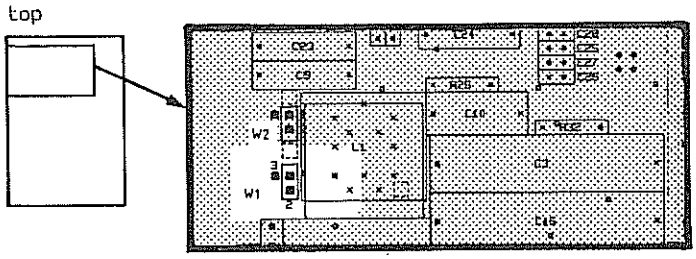
(1) For an XTV5 SF or FB system position jumper W2 as shown below.



(2) For an XTV5 HFB system position jumper WK2 as shown below.

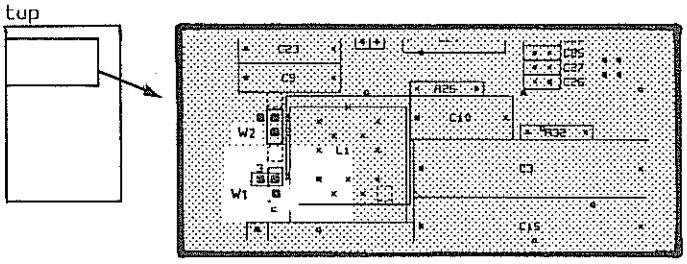


(3) For an XTV5 SF or FB system position jumper W1 as shown below.

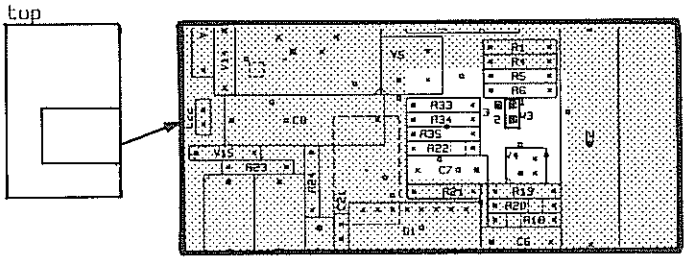


5.3. HORIZONTAL DEFLECTION BOARD WK3 (Cont.)

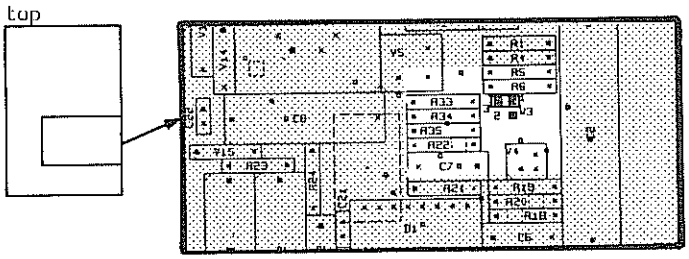
(4) For an HFB system position jumper W1 as shown below.



(5) For an XTV5 SF or FB system position jumper W3 as shown below.

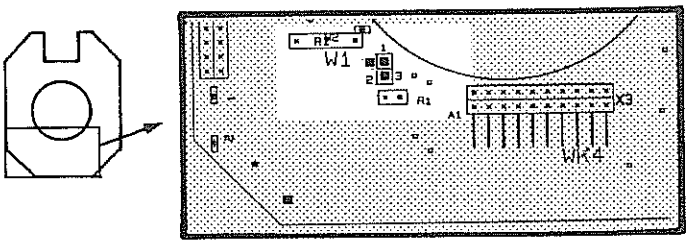


(6) For an XTV5 HFB system position jumper W3 as shown below.



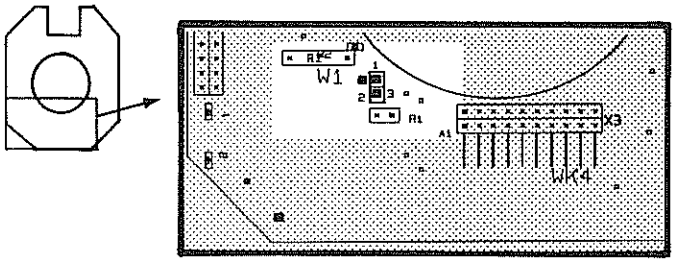
5.4. BACK PANEL BOARD WK5

(1) For Vidicon XQ1285, position jumper W1 as shown below.



5.4. BACK PANEL BOARD WK5 (Cont.)

(2) For Vidicon XQ 1285, position jumper W1 as shown below.



Einbau der FS-Kameraeinheit

(1) Vor dem Einbau einer neuen Kameraeinheit die steckbare Platine WK1 herausnehmen.

(2) Die Lage der Kameraspulen in der Kameraeinheit prüfen: die Drahtenden der Kameraspulen müssen sich an der rechten Seite von Vorverstärker WK2

(3) Die Kamera vorsichtig über das Vidicon absenken und dabei darauf achten, dass die Targetleitung durch die Koppelplatte hindurch kommt, dass der Pfeil auf dem BV-Gehäuse auf die Mitte der Millimeterskala auf dem Flansch der Fernsehkamera zeigt und dass die Fernsehkameraeinheit richtig auf dem BV-Gehäuse sitzt.

(4) Die 3 Schrauben mit den Erdungs-Unterlegscheiben auf dem Flansch der Fernsehkamera gut festziehen.

(5) Die Röhrenfassung gerade auf das Vidicon stecken; dabei den kurzen Stift beachten.

(6) Die steckbare Platine W1 wieder einsetzen und festschrauben. Auch die anderen WK-Platinen prüfen, ob sie gut festsitzen.

(7) Den Videostecker und den Kamerakabelstecker wieder am AMP-Stecker X4 der Fernsehkamera anschliessen.

(8) Die Haube auf die Kamera setzen und festschrauben.

(9) Schilder und Aufkleber mit dem PEI-Nummer ander zentrale Informationsstelle "I" auf den aktuellen Stand bringen.

ANMERKUNG

Nach Ersatz von sowohl der Kameraeinheit als auch dem Vidicon muss das ganze Fernsehsystem geprüft und nötigfalls neu eingestellt werden. Siehe hierfür die Videoeinstellungen.

Zusätzliches Linsenputzpapier, Codenummer 4522 980 16441, und optisches Oel, Codenummer 4522 980 18001, kann bestellt werden bei:

Philips Medical Systems
Technical Service
Spare Parts Management
Building QM
Eindhoven
Niederlande

5.3. ERSATZ VON PRACTIX-C-TANK/BLENDE

- Den Tragbügel von Practix-C-Tank und Blende nicht abnehmen, damit die Ausrichtung gegenüber dem C-Bogen nicht verlorengeht.

- Die Verpackung von neuen Practix-C-Tank und Blende wieder benutzen für die Rücksendung von defekter Einheit.

Ausbau von Practix-C-Tank/Blende (Wenn nur die Blendeneinheit, siehe die Anleitung den fahrbaren Stative, Abschnitt P).

(1) Den C-Bogen senkrecht stellen, mit Practix-C-Tank unten, und verriegeln.

(2) Die Blendenabdeckung abnehmen (4 Schrauben M3).

(3) Die kleine Montageplatte an der Seite des bügels losschraubenund die Einstellschraube aus der Blendeneinheit herausnehmen.

(4) Den Kabelstecker von Konnektor LAX1 der Blende und die Erdleitungen lösen.

(5) Den Tankkabelstecker von Konnektor GAX1 des Tanks lösen. Nicht erforderlich, wenn nur die Blende ersetzt wird.

(6) Die Lage der Blendeneinheit auf dem Tragbügel markieren.

(7) Die 4 Befestigungsschrauben M4 losschrauben und die Blende von dem Tragbügel abheben.

(8) Die 4 Innensechskantschrauben M6 losschrauben und den Tank von dem Tragbügel abheben. Dabei das Tankgehäuse unterstützen.

Einbau des Bildverstärkers

(1) Den C-Bogen in die waagerechte Lage bringen und verriegeln.

(2) Den Kaliberstift aus der Parkstellung in der Nähe der X2-Marke auf dem Bv-Gehäuse herausschrauben und aufbewahren.

(3) Das Typennummernschild des neuen BV auf dem Gehäuse befestigen. Die alte Platte abnehmen.

(4) Die Plastikschutzkappe noch nicht von dem Austrittsfenster abnehmen.

(5) Die BV-Röhre vorsichtig in das Gehäuse schieben und prüfen, ob sie einwandfrei in dem Gehäuse anliegt.

(6) Darauf achten, dass der Referenzstift in dem Gehäuse in die entsprechende Oefnnung in der BV-Röhre kommt.

(7) Den C-Bogen entriegeln, senkrecht stellen, mit dem BV nach unten, und wieder verriegeln.

(8) Den Eingangsteil so in das Gehäuse setzen, dass die Marken auf dem Eingangsteil und dem Rand des BV-Gehäuses zusammenfallen und dann den Eingangsteil mit 8 Senkschrauben M4 an dem Gehäuse festschrauben.

(9) Die 4 gummidichtungen so zwischen den Bv-Schirm und den Eingangsteil legen, dass die Ausschnitte des Eingangsteils frei bleiben.

(10) Mit Hilfe der Einstellschrauben und des Kaliberstifes die Gummidichtungen gegen den BV-Schirm pressen; hierzu die Schrauben abwechselnd und gleichmässig anziehen. Der Kaliberstift muss genau zwischen dem BV-Schirm und den Aluminiumring passen.

WARNUNG

DARAUF ACHTEN, DASS DER KALIBERSTIFT NICHT KLEMMT, IMPLOSIONS GEFAHR.

(11) Die Sicherungsmuttern anziehen, dabei die Einstellschrauben mit einem Schraubenzieher festhalten, damit sie sich nicht drehen.

(12) Die schwarze Implosionsplatte mit 4 Senkschrauben M3 befestigen.

(13) Den Metallring mit 4 Senkschrauben M5 auf dem Gehäuse befestigen.

(14) Falls erforderlich, das Raster mit 4 Senkschrauben M4 befestigen. Der Markerungsstrich muss senkrecht auf der flachen Seite des BV-Gehäuses stehen.

(15) Den C-Bogen entriegeln, senkrecht stellen, mit dem BV oben, und wieder verriegeln.

(16) Den Kaliberstift wieder in der Nähe der X2-Marke wegstecken.

(17) Die Klemmern für die Hochspannungsstecker lösen und die Kappen von den Hochspannungsbuchsen des neuen BV abnehmen.

(18) Falls erforderlich, die Hochspannungsanschlüsse an der Kabelseite und der Steckerseite einfetten.

(19) Die Hochspannungsstecker K1, X2, X4 und die Erdungsleitung an die BV-Röhre anschliessen. Die Hoghspannungsstecker gut hineindrücken.

(20) Die Klemmern der Hochspannungsstecker so befestigen, dass die Stecker nicht mehr bewegt werden können und ein Ueberspringen der Hochspanung vermieden wird.

(21) Die Plastikschutzkappe vom BV-Austrittsfenster abnehmen, damit das Vidicon angekoppelt werden kann.

(22) Die drei Abschirmstücke und die mit dem BV mitgelieferten speziellen federnden Unterlegscheiben auf dem Metallring um das Austrittsfenster montieren.

ANMERKUNG

Die Lichtausbeute des neuen BV kann vor dem Anschliessen der Fernsehkamera geprüft werden. Nach dem Einschalten der Anlage muss das Austrittsfenster des BV nach einem Durchleuchtungsbefehl aufleuchten. Blicken Sie aber nicht direkt in das Austrittsfenster - Röntgenstrahlung!

(23) Die Fernsehkamera und ihre Haube montieren; siehe hierfür: Ersatz der Fernsehkamera.

ANMERKUNG

Nach dem Ersatz des BV müssen wegen des Konversionsfaktors GX die fokussierspannung am HS-Kaskadengenerator neu eingestellt und die elektrodenoptische Empfindlichkeit (EOS in $\frac{nA}{\mu R/s}$) geprüft werden.

(24) Schilder und Aufkleber mit dem PEI-Nummer an der zentrale Informationsstelle "I" auf den aktuellen Stand bringen.

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5.2. ERSATZ DER FERNSEHKAMERA (siehe FZ-3, FZ-4)

Ausbau der FS-Kameraeinheit

(1) Den C-Bogen senkrecht stellen, mit dem Bildverstärker oben, und arretieren.

(2) Die Kamerahaube abnehmen.

(3) Den Stecker des Videokabels und Stecker XA des Kamerakabels an der unteren Platine der FS-Kamera abnehmen.

(4) Die steckbare Platine WK1 (mit LED-Anzeige) von der FS-Kamera abnehmen (4 Schrauben M3).

(5) Die 3 unverlierbaren Befestigungsschrauben am Flansch der FS-Kamera lösen.

(6) Die Röhrenfassung von dem Vidicon abziehen.

(7) Vorsichtig die FS-Kamera von dem Vidicon abziehen.

Ausbau der Kameraröhre (Vidicon)

(8) Durch wechselseitiges und gleichmäßiges Drehen an den 3 Schrauben die Koppelplatte lösen.

(9) Die Koppelplatte abnehmen, aber nicht die 3 Abstandsstücke.

(10) Das Vidicon eine viertel Umdrehung drehen und das Vidicon senkrecht von dem Bildverstärker abheben.

Einbau der Kameraröhre (Vidicon)

(1) Die Faseroptik von sowohl dem Bildverstärker als auch dem Vidicon mit dem mitgelieferten Linsenputzpapier 4522 980 16441 und Alkohol reinigen.

(2) Niemals in Silicon getränktes Papier benutzen, weil die Faseroptik damit beschädigt werden kann.

(3) Ein Blatt Papier immer nur einmal benutzen.

(4) Beim Reinigen das Papier nur gradlinig in Faserrichtung bewegen, keine kreisförmigen Bewegungen.

(5) Die Faseroptik nicht anfeuchten und nicht darauf blasen.

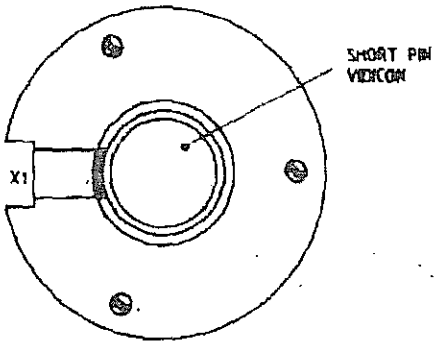
(6) Der Alkohol muss vor dem Zusammenbau völlig verdunstet sein.

(7) Mit einer Lampe oder einem Blitzlicht prüfen, ob die Faseroptiken völlig staubfrei sind und keine Unregelmäßigkeiten aufweisen.

(8) Zwei Tropfen optisches Oel (4522 980 18001, mit dem BV-Gehäuse mitgeliefert) mit dem Draht an dem oberen Ende der Oelflasche in der Mitte der BV-Faseroptik anbringen.

(9) Die Kopplungsplatte auf das Vidicon schieben und das Vidicon so drehen, dass

- der kurze Stift sich gegenüber dem Ausschnitt der Kogelplatte befindet und dass
- die weisse Marke auf dem Vidicon mit der einzelnen Marke auf der Koppelplatte zusammenfällt.



ANMERKUNG

Nach dem Einbau eines neuen Vidicons seine Code- und Seriennummer notieren.

(10) Die Kombination von Koppelplatte und Vidicon so positionieren, dass der Ausschnitt in der Koppelplatte sich bei der X1-Marke des Bildverstärkers befindet.

(11) Die Kombination von Vidicon und Koppelplatte senkrecht auf die Faser optik des Bildverstärkers drücken und die 3 Schrauben der Koppelplatte abwechselnd und gleichmäßig anziehen.
Prüfen, ob die Marken noch einander gegenüberstehen. Falls erforderlich, das Vidicon vorsichtig drehen, aber nicht anheben.

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Section C: SETTING TO WORK

CONTENTS

1. INTRODUCTION C-1

2. EQUIPMENT REQUIRED C-1

3. SETTING-UP AND TESTING C-1

3.1. COUPLING PLATE ADJUSTMENT C-1

4. CONTROLS AND ADJUSTMENTS C-1

5. TEST POINTS C-1

6. INDICATORS C-2

LIST OF TABLES

TABLE C-1: CONTROLS AND ADJUSTMENTS C-2

TABLE C-2: TEST POINTS C-2

TABLE C-3: INDICATORS C-7

1. INTRODUCTION

This section describes the control, adjustment, and test facilities for the XTV5 Camera FB/HFB. Instructions on Setting to Work may be found in the group level documentation.

2. EQUIPMENT REQUIRED

MULTIMETERS	OSCILLOSCOPES	
PM2411	PM3110	PM3226
PM2412/01/02	PM3210	PM3232
PM2412A	PM3231	PM3233
PM2503	PM3200	PM3240
PM2517X (Preferred)	PM3225	
or equivalent	or equivalent	

3. SETTING-UP AND TESTING

Step-by-step procedures for setting-up and testing the XTV5 Camera FB/HFB may be found in the group documentati

3.1. COUPLING PLATE ADJUSTMENT

In the event that the entire II output-screen image falls outside the target area, proceed as follows:

1) In an x-ray system, initiate fluoroscopy and check the T.V. monitor image. Ensure that the complete II output-screen image within the lead (Pb) edge is visible on the target. If necessary enlarge the monitor circle diameter.

WARNING

Radiation hazard. The following adjustment must be done under radiation. Ensure that proper safety precautions have been taken.

2) If the II output-screen image (as seen at the T.V. monitor) is not completely visible, loosen the mounting screws and adjust the alignment screws unti the complete II output-screen image is visible.

3) Tighten the mounting screws. Stop fluoroscopy. Re-adjust monitor cirlce diameter, scan amplitude, scan shifts, and re-focus electrically.

4. CONTROLS AND ADJUSTMENTS

The controls and adjustments for the XTV5 Camera FB/HFB are listed in Table C-1.

5. TEST POINTS

The test points for the XTV5 Camera FB/HFB are listed in Table C-2.

6. INDICATORS

The indicators for the XTV5 Camera FB/HFB are listed in Table C-3.

TABLE C-1 CONTROLS AND ADJUSTMENTS

LOCATION	NAME	FUNCTION
LENS' holder	Lens objectors	To adjust the distance between camera image tube target and the image intensifier lens.
Around camera image tube	Deflection coil assembly	Can be rotated to adjust orientation of scanning pattern on camera image tube target.
Preamplifier Board WK2	test-switch S1	To select signal source for adjustment of frequency emphasis; either from the test signal generator or during actual fluoroscopy.
	Frequence emphasis potentiometer C30	To adjust frequency emphasis response of the video preamplifier.
	Jumper W1	To select an XTV5 system.
	Jumper W2	To select on XTV5 system.
	Jumper W3	To select transfer impedance.
	Test signal adjust potentiometer C16	To adjust test signal pulse response or to adjust the black-white step during radiation.
Horizontal Deflection Board WK3	Jumper W1	To select an XTV5 Q or XTV5 H system.
	Jumper W2	To select an XTV5 Q or XTV5 H system.
	Jumper W3	To select on XTV5 Q or XTV5 H system.
Base Plate Board WK5	Jumper W1	To select source of for the High Voltage Board WK4
Vertical Deflection Board WK1	VG1-adjust	To adjust VG1 range (tube dependent)

TABLE C-2 TEST POINTS

LOCATION	NAME	MEASUREMENT
Preamplifier Board WK2	Test Point MP1	a) i_{in} . 365.10^3 $\pm$ 5%; bandwidth 1MHz - 3dB; bandwidth $1/37.10^3$ C_{in}; C_{in} 25 pF. b) 60V in; bandwidth 25MHz - 3dB
	Test Point MP2	0V $\pm$ 2%
	Test Point MP3	a) i_{in} . 350.10^3 $\pm$ 5%; bandwidth 25MHz - 3dB; C_{in} 25pF after C30 adjusted. b) maximum signal amplitude 1300 mV. c) low frequency overshoot a/b x 100%; 250KHz 4%; 50Hz 40% d) overshoot a/b x 100% 5% with pulse flank slope 15ns $\pm$ 5ns amplitude 600mV. e) Signal/Noise ratio 47dB (i_s = 300mA); C_{in} 30pF. f) Q-version; bandwidth 15MHz, -3dB. g) S1:1 and S1:2 closed and S1:3 and S1:4 open; pulse frequence 0.2 µs < T > 3 µsec.

TABLE C-2 TEST POINTS (Cont.)

LOCATION	NAME	MEASUREMENT
Vertical Deflection Board WK1	Test Point MS1	Combination pulse imput +4.3V ±1V +2V ±0.5V -0.5V ±0.5V
	Test Point MS2	V1 output 0.2V ±0.2V when 3.5V V(X1:B3) 4.1V 6.3V ±0.2V when 0V V(X1:B3) 2.6V
	Test Point MS3	D1B output +6.3V ±0.2V 0.2V ± 0.2V V(X1:B3) t t = 96.5 µsec ± 30%
	Test Point MS5	V2 output +5.5V -13.5V ± 1.6V
	Test Point MS7 and (X1:A4)	20 msec +1.8V ±0.3V a) a) Conditions: V(X1:A5)= -10V ±0.1V V(X1:B8)= 0V -3.9V ±0.2V +1.8V ±0.2V b) b) Conditions: V(X1:A5)= +10V ±0.1V V(X1:B8)= 0V -4.0 ± 0.2V c) Conditions: V(X1:A5) -10V ±0.1V V(X1:B8) +10V ±0.1V c) Voltages 2.2V ± 0.2V higher than at a). d) Conditions: V(X1:A5) +10V ±0.1V V(X1:B8) +10V ±0.1V d) Voltages 2.2V ± 0.2V higher than at b).

TABLE C-2 TEST POINTS (Cont.)

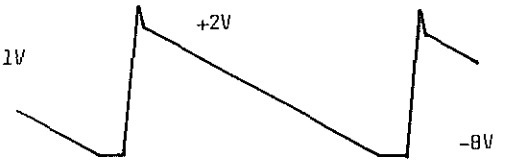
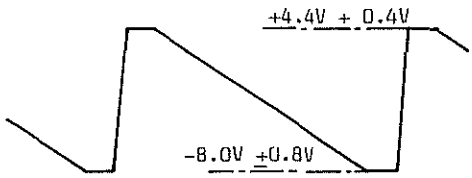
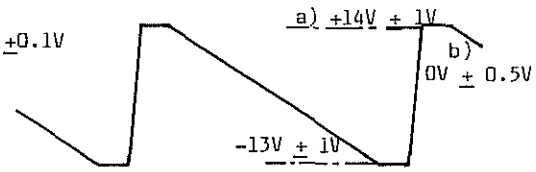
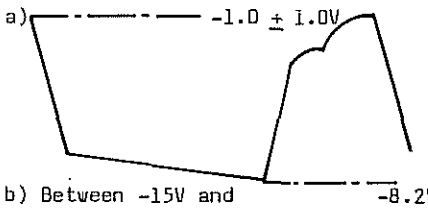
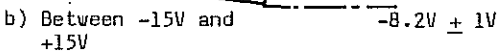
LOCATION	NAME	MEASUREMENT
Vertical Deflection Board WK1	Test Point MS8	Conditions: V(X1:A5)= +10V ±0.1V V(X1:B8)= 0V 62 Ω, 1%, P W between (X1:A4) and (X1:B4) 
	Test Point X1:B4	Conditions: Same as MS8 
	Test Point MS11	Conditions: a) Same as MS8 b) V(X1:A5)= +10V ±0.1V V(X1:B8)= 0V (X1:A4) and (X1:B4) connected 
	Test Point MS12	Conditions: a) 62 Ω, 1% P /W between X1:A4 and X1:B4 top of sawtooth at MS7 0.7V — a) +5.5V ± 0.5V b) Same as MS11 b). — b) -0.5V ± 0.3V
	Test Point MS13	Conditions: a) Same as MS8  b) No connection between (X1:B4) and (X1:A4) — b) Between -15V and +15V 
	Test Point MS15	Conditions: a) Same as MS8 — a) +6.3V ± 0.2V b) No connection between (X1:B4) and (X1:A4) — b) +0.2V ± 0.2V

TABLE C-2 TEST POINTS (Cont.)

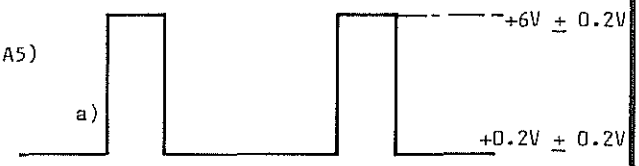
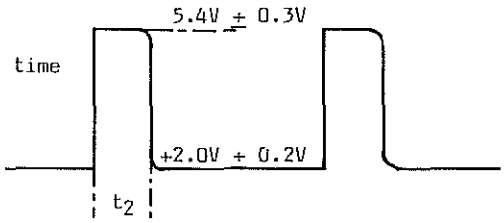
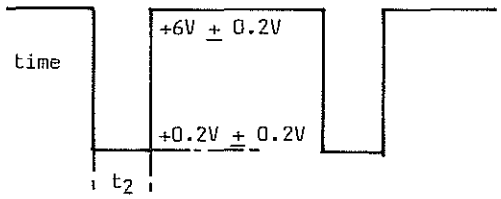
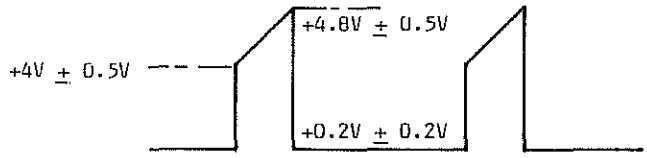
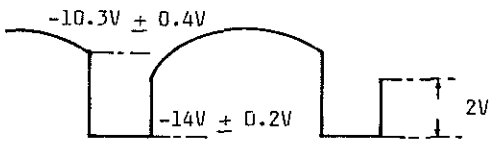
LOCATION	NAME	MEASUREMENT
Vertical Deflection Board WK1	Test Point MS19	Conditions: a) One or more inputs to D2:="0" a) +6.3V ± 0.2V b) One or more inputs to D2:="1" b) -0.5V ± 0.2V
	Test Point MS20	Conditions: a) V(MS19) = +0.2V ± 0.2V a) +4.4V ± 0.6V b) V(MS19) = +6.0V ± 0.4V b) +0.3V ± 0.2V
	Test Point MS25	+10.1V ± 5%
Horizontal Deflection Board WK3	Test Point MS2	Conditions: a) If V(X1:A5) +1.6V  b) If V(X1:A5) = 0V ± 0.2V b) +0.2V ± 0.2V +6V ± 0.2V
	Test Point MS3	Conditions: t_2 = flyback time 
	Test Point MS4	Conditions: t_2 = flyback time 
	Test Point MS5	
	Test Point MS7	

TABLE C-2 TEST POINT (Cont.)

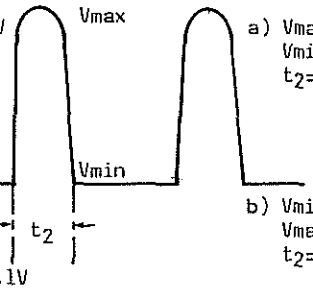
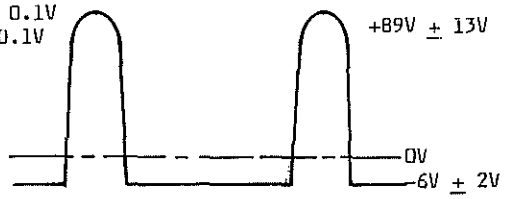
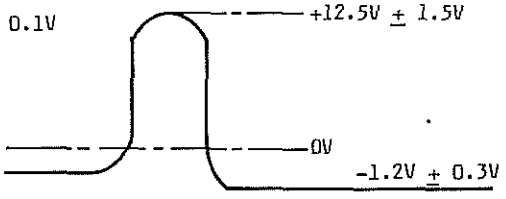
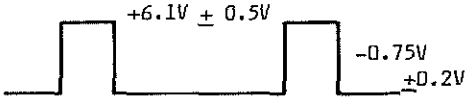
LOCATION	NAME	MEASUREMENT
Horizontal Deflection Board WK3	Test Point MS10	Conditions: V(X1:B4) ≈ -7V ± 0.1V Waveform same as MS11. V_{min} = -13V ± 2V V_{max} = +80V ± 13V
	Test Point MS11	Conditions: a) V(X1:B4)=-7V ±0.1V W1 1-3 W2 1-3 W3 1-2 COMBL PULSE ≈ (T = 32 µsec ± 2 µsec) (t = 2 µsec ± 8.5 µsec) b) V(X1:B4)= -7V ± 0.1V c) V(X1:B4)= 0V  a) Vmax= +95V ± 15V Vmin= -14.5V ±0.5V t_2= 3.4 µsec ± 0.3 µsec b) Vmin= -14.5V ±0.5V Vmax= 100V ± 15V t_2= 5.8 µsec ± 0.3 µsec c) Vmin= -14.5V ±0.5V Vmax= 140V ± 15V t_2= 6.2 µsec ± 0.3 µsec
	Test Point MS12	Conditions: a) V(X1:B6) = 0V ± 0.1V b) V(X1:B6) = +15V ± 0.1V a) +13.2V ± 1V b) average 1V
	Test Point MS13	Conditions: V(X1:B4) = -7V ± 0.1V V(X1:B8) = 0V ± 0.1V 
	Test Point MS14	Conditions: V(X1:B4) = -7V ± 0.1V 
	Test Point MS16	Conditions: V(X1:B4) = -7V ± 0.1V 

TABLE C-2 TEST POINTS (Cont.)

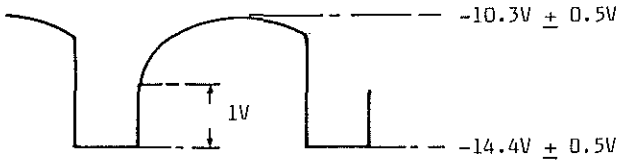
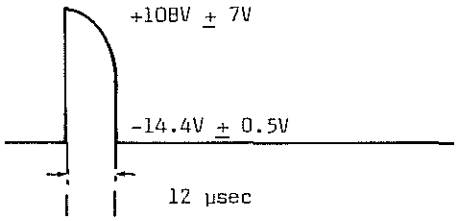
LOCATION	NAME	MEASUREMENT
High Voltage Board WK4	Test Point MS1	Sinus signal: 1kHz ± 10%; amplitude average 0V ± 0.5V
	Test Point MS2	Sinus signal: 1kHz ± 10%; amplitude average 10V ± 0.5V
	Test Point MS4	
	Test Point MS5	
	Test Point MS6	-109V ± 7V
	Test Point MS7	-25.8V ± 3V
	Test Point MS8	0V ± 0.1V
	Test Point MS9	-2.5V ± 1.5V
	Test Point MS11	V(MS11) = V(X1:B7) ± 2%

TABLE C-3 INDICATORS		
LOCATION	NAME	INDICATION
Vertical Deflection Board WK1	LED H1 HVHI	Tube voltage supply high when LED lit. V(X1:B6) -10V ± 0.1V.
	LED H2 HVLO	Tube voltage supply low when LED lit. V(X1:B6) +10V ± 0.1V.
	LED H3 VEPU	INTERRUPTION signal received from WK3 when LED lit. V(MS2) contains no a.c. signal.
	LED H4 VESC	V(MS11) = 0V ± 0.5V when LED lit.
	LED H5 VEIR	SHORT CIRUIT signal received from WK3 when LED lit.
	LED H6 BECU	When Beam Current suppression: = "0", LED lights. (X1:A9)
	LED H7 HOIR	When H-Scan Failure: = "0", LED lights. (X1:A10)
	LED H8 HOSL	When H-Scan Failure: "0", LED lights. (X1:A7)

Section F: CORRECTIVE MAINTENANCE

CONTENTS:

1. INTRODUCTION F-1

2. TEST EQUIPMENT RECOMMENDED F-1

3. SPECIAL TOOLS F-1

4. TROUBLESHOOTING PROCEDURES F-1

4.1. GENERAL F-1

4.2. SPECIFIC F-1

LIST OF FLOW DIAGRAMS

LOOP F1: CAMERA INPUT SUPPLY VOLTAGES

LOOP F2: H-, V-, AND COMBI PULSE SUPPLY

LOOP F3: CAMERA IMAGE TUBE SUPPLIES

LOOP F4: FOCUS AND ALIGNMENT COILS

LOOP F5: VIDEO

1. INTRODUCTION

This section contains troubleshooting procedures and a list of approved test equipment.

2. TEST EQUIPMENT REQUIRED

Multimeters	Oscilloscopes
PM 2411	PM 3110
PM 2412/01/02	PM 3210
PM 2412A	PM 3231
PM 2503	PM 3200
PM 2517X (Preferred)	PM 3225
	PM 3226
	PM 3232
	PM 3233
	PM 3240

3. SPECIAL TOOLS

Special flat cable extenders will be necessary to measure the p.c.b. and plug points.

4. TROUBLESHOOTING PROCEDURES

4.1. GENERAL

Familiarity with the circuits is recommended before any troubleshooting is attempted. Please ensure that this unit is the source of malfunction. Consult the sub-system level troubleshooting flow diagrams before beginning. See Section G, EXPLANATIONS, for a description of flow-chart symbols.

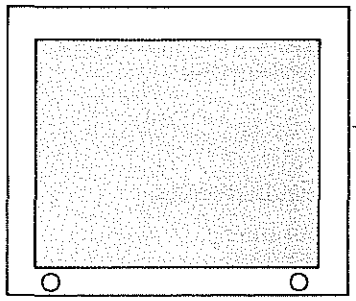
4.2. SPECIFIC

WARNING

Shock hazards as high as 1000V are exposed when operating the camera without the hood.

1. Remove the camera hood. Connect boards WK1, WK2, WK3 and WK4 to boards WK5 and WK6 with the flat cable extenders. See Figure FZ-1.
2. Connect a correctly functioning control unit and monitor to the XTV5 Camera.
3. After identifying the functional loop that appears to be faulty, trace the malfunction as indicated in the flow chart.
4. After locating the malfunction with the help of the TROUBLESHOOTING CHARTS (detail 2 on the Z3-drawings), repair or replace as is appropriate.
5. After repair or replacement, check through the troubleshooting loop once again.

XTV5 CAMERA -FB/HFB GENERAL TROUBLESHOOTING

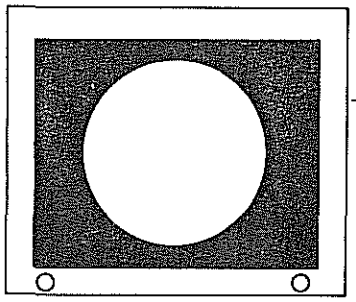


BRIGHTNESS CCU POWER ON, NO IMAGE

YES → MONITOR CONTRAST TOO LOW → Adjust monitor

YES → VIDEO PROCESSOR FAULTY → Check doc. for T.V. control unit

NO



MONITOR CIRCLE, NO IMAGE

YES → BEAM NOT SCANNING THE TARGET AT IMAGE TUBE → Check in accordance with LOOP F2

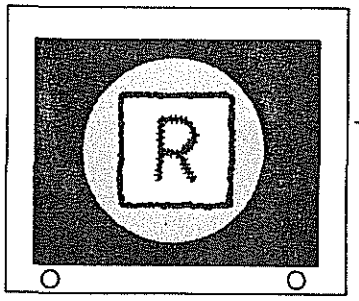
YES → HIGH VOLTAGE ABSENT OR INCORRECT AT G3 AND G4 → Check in accordance with LOOP F3

YES → NO FILAMENT VOLTAGE → Check in accordance with LOOP F3

YES → TARGET VOLTAGE TOO LOW → Check in accordance with LOOP F5

YES → VIDEO PREAMPLIFIER STAGE DEFECTIVE → Check in accordance with LOOP F5

NO



ENTIRE IMAGE FOCUSED

NO → FIBRE COUPLING FAULTY → Check doc. for BV25

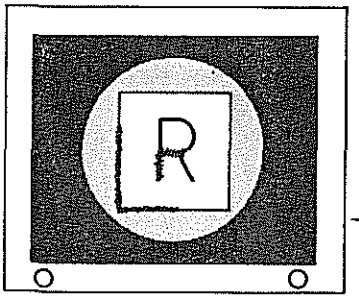
NO → IMAGE INTENSIFIER NOT FOCUSSED → Focus image intensifier

NO → VOLTAGES AT CAMERA TUBE FAULTY → Check in accordance with LOOP F3

NO → VOLTAGE OR CURRENT AT FOCUS COILS FAULTY → Check in accordance with LOOP F4

NO → FOCUS COILS FAULTY → Check focus coil windings. Repair or replace.

YES

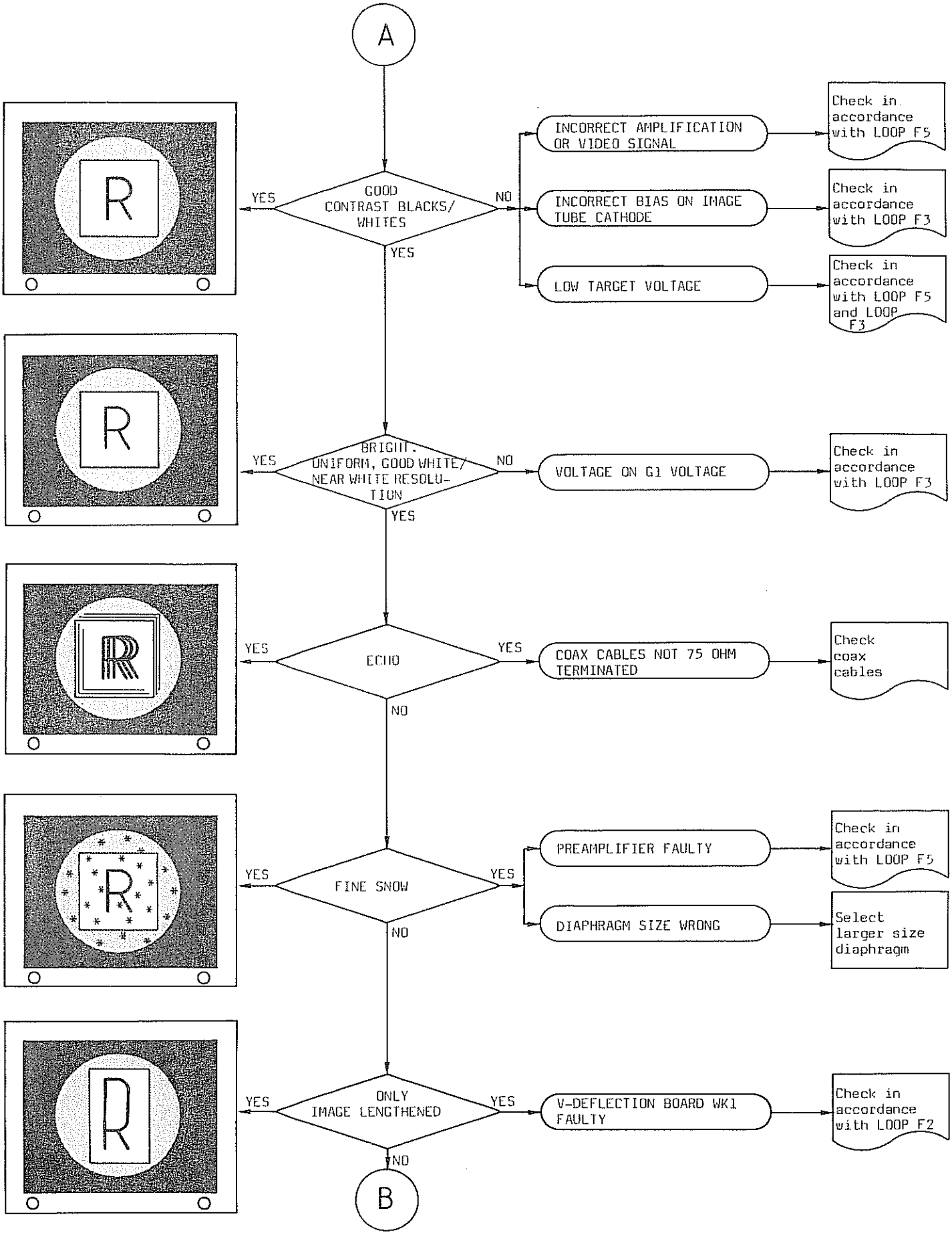


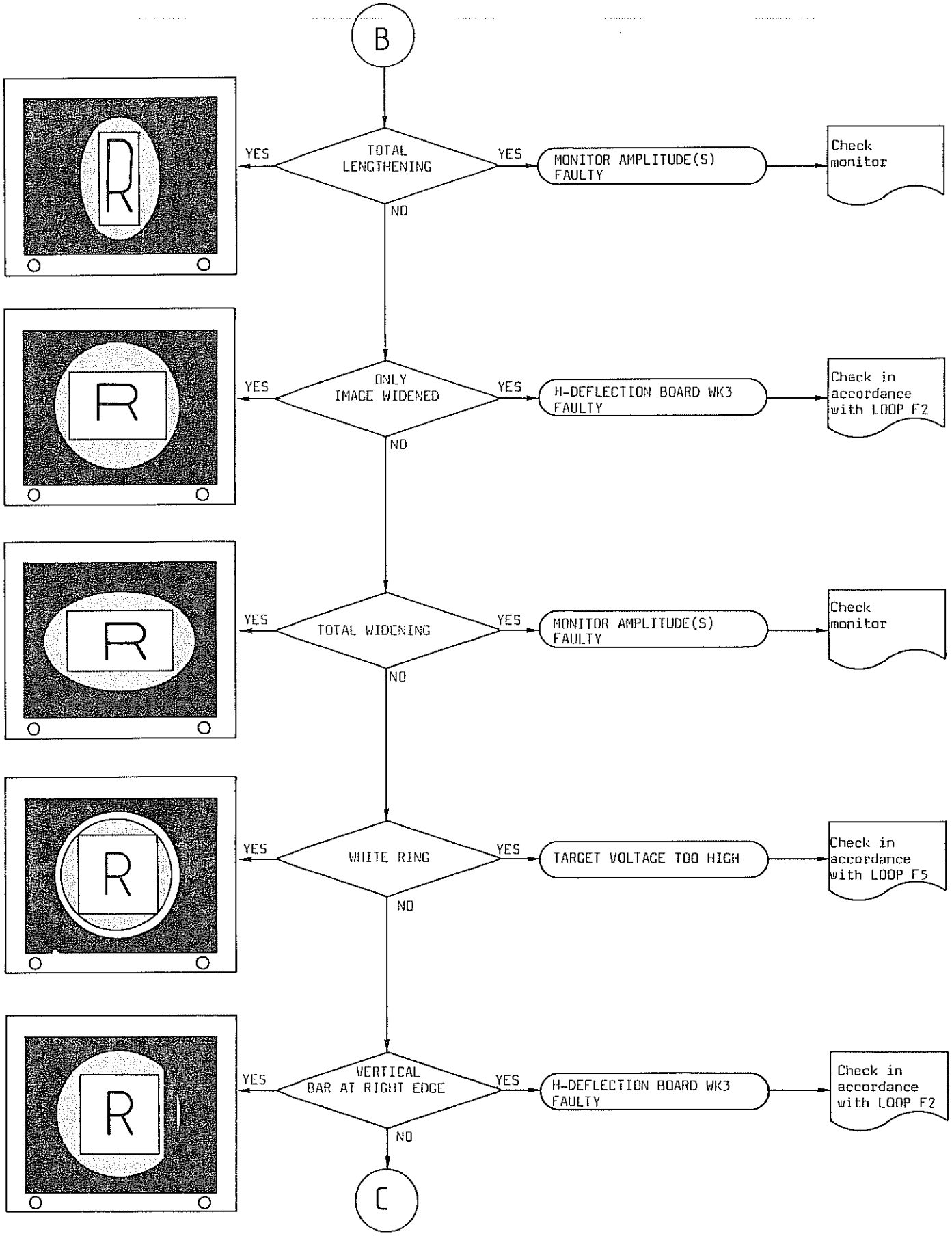
SOME BUT NOT ALL IMAGE FOCUSED

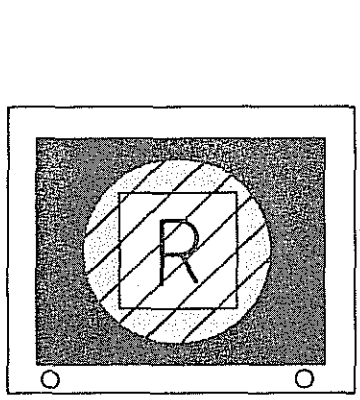
YES → FIBERS NOT IN PLANE PARALLEL → Adjust fibre coupling

NO

A


A
R
YES
GOOD CONTRAST BLACKS/ WHITES
NO
INCORRECT AMPLIFICATION OR VIDEO SIGNAL
Check in accordance with LOOP F5
INCORRECT BIAS ON IMAGE TUBE CATHODE
Check in accordance with LOOP F3
LOW TARGET VOLTAGE
Check in accordance with LOOP F5 and LOOP F3
YES
R
YES
BRIGHT. UNIFORM, GOOD WHITE/ NEAR WHITE RESOLU- TION
NO
VOLTAGE ON G1 VOLTAGE
Check in accordance with LOOP F3
YES
R
YES
ECHO
YES
COAX CABLES NOT 75 OHM TERMINATED
Check coax cables
NO
R
YES
FINE SNOW
YES
PREAMPLIFIER FAULTY
Check in accordance with LOOP F5
DIAPHRAGM SIZE WRONG
Select larger size diaphragm
NO
R
YES
ONLY IMAGE LENGTHENED
YES
V-DEFLECTION BOARD WK1 FAULTY
Check in accordance with LOOP F2
NO
B


B
R
YES
TOTAL LENGTHENING
YES
MONITOR AMPLITUDE(S) FAULTY
Check monitor
NO
R
YES
ONLY IMAGE WIDENED
YES
H-DEFLECTION BOARD WK3 FAULTY
Check in accordance with LOOP F2
NO
R
YES
TOTAL WIDENING
YES
MONITOR AMPLITUDE(S) FAULTY
Check monitor
NO
R
YES
WHITE RING
YES
TARGET VOLTAGE TOO HIGH
Check in accordance with LOOP F5
NO
R
YES
VERTICAL BAR AT RIGHT EDGE
YES
H-DEFLECTION BOARD WK3 FAULTY
Check in accordance with LOOP F2
NO
C



C

YES

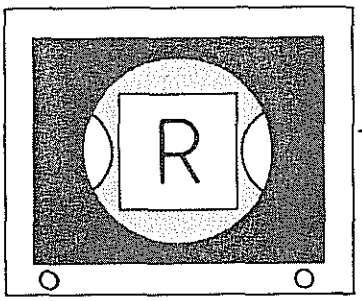
BLACK ROLLING DIAGONAL LINES

YES

BLANKING CIRCUIT FAULTY

Check in accordance with LOOP F2 and F3

NO



NO

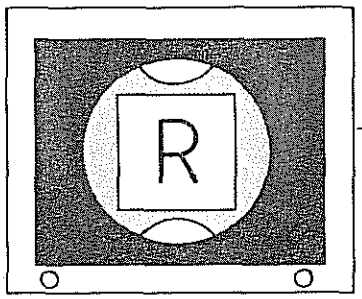
CIRCLE FILLES LEFT/RIGHT

NO

H-DEFLECTION BOARD WK3 FAULTY

Check in accordance with LOOP F2

YES



NO

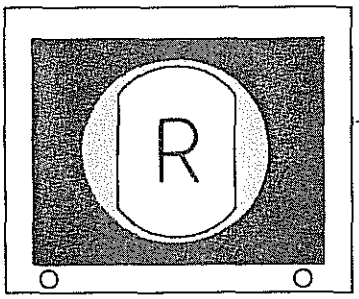
CIRCLE FILLED TOP/BOTTOM

NO

V-DEFLECTION BOARD WK1 FAULTY

Check in accordance with LOOP F2

YES



YES

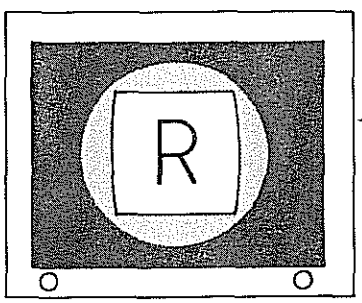
IMAGE COMPRESSED AT SIDES

YES

H-DEFLECTION NON-LINEAR

Check in accordance with LOOP F2

NO



YES

IMAGE COMPRESSED AT TOP

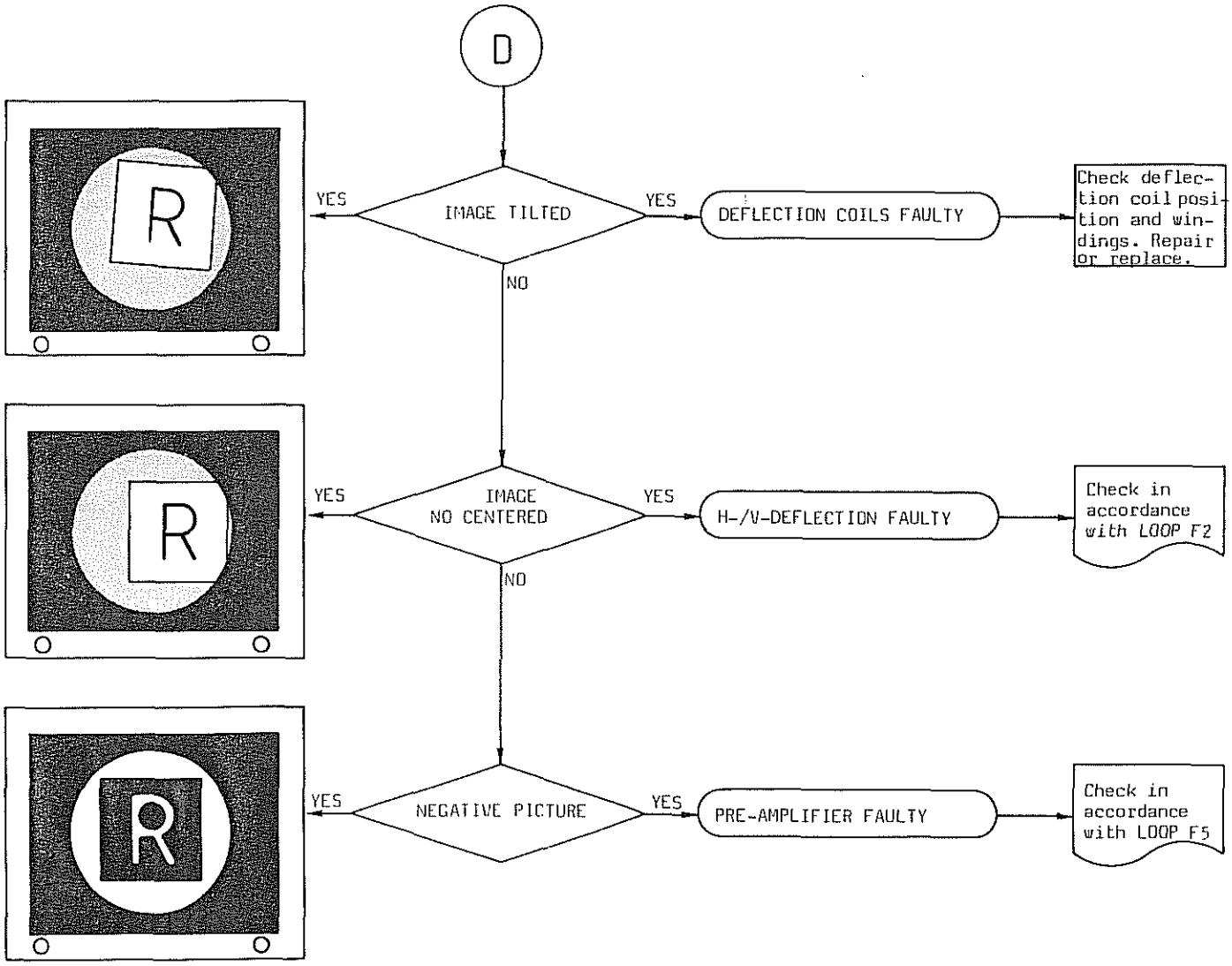
YES

V-DEFLECTION NON-LINEAR

Check in accordance with LOOP F2

NO

D


D
R
YES
IMAGE TILTED
YES
DEFLECTION COILS FAULTY
Check deflection coil position and windings. Repair or replace.
NO
R
YES
IMAGE NO CENTERED
YES
H-/V-DEFLECTION FAULTY
Check in accordance with LOOP F2
NO
R
YES
NEGATIVE PICTURE
YES
PRE-AMPLIFIER FAULTY
Check in accordance with LOOP F5

LOOP F1: CAMERA INPUT SUPPLY VOLTAGES

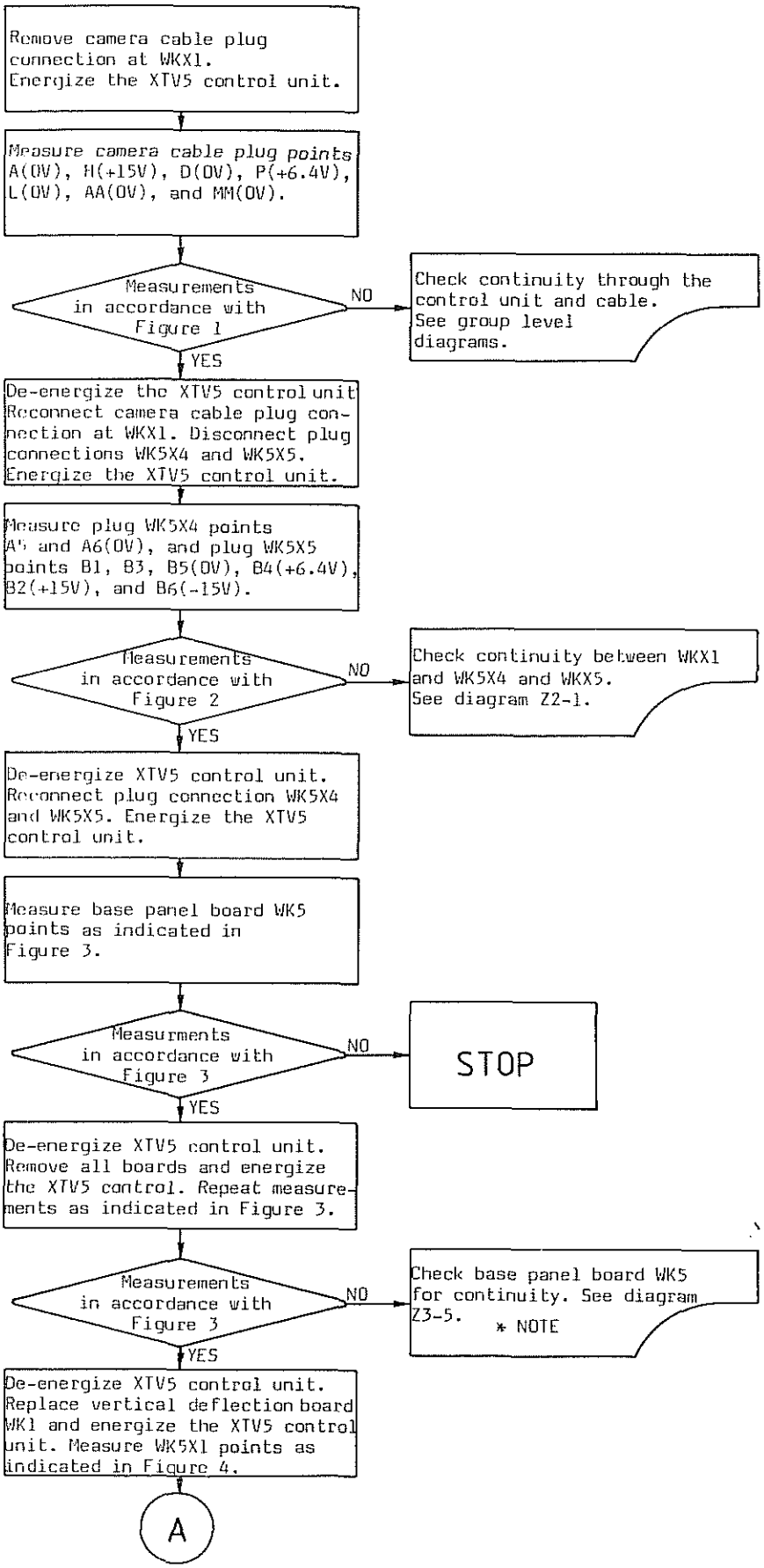

Remove camera cable plug connection at WKX1. Energize the XTV5 control unit.
Measure camera cable plug points A(0V), H(+15V), D(0V), P(+6.4V), L(0V), AA(0V), and MM(0V).
Measurements in accordance with Figure 1
NO
Check continuity through the control unit and cable. See group level diagrams.
YES
De-energize the XTV5 control unit Reconnect camera cable plug connection at WKX1. Disconnect plug connections WK5X4 and WK5X5. Energize the XTV5 control unit.
Measure plug WK5X4 points A5 and A6(0V), and plug WK5X5 points B1, B3, B5(0V), B4(+6.4V), B2(+15V), and B6(-15V).
Measurements in accordance with Figure 2
NO
Check continuity between WKX1 and WK5X4 and WKX5. See diagram Z2-1.
YES
De-energize XTV5 control unit. Reconnect plug connection WK5X4 and WK5X5. Energize the XTV5 control unit.
Measure base panel board WK5 points as indicated in Figure 3.
Measurments in accordance with Figure 3
NO
STOP
YES
De-energize XTV5 control unit. Remove all boards and energize the XTV5 control. Repeat measurements as indicated in Figure 3.
Measurements in accordance with Figure 3
NO
Check base panel board WK5 for continuity. See diagram Z3-5.
* NOTE
YES
De-energize XTV5 control unit. Replace vertical deflection board WK1 and energize the XTV5 control unit. Measure WK5X1 points as indicated in Figure 4.
A

Figure 1

PLUG	POINT	MEASUREMENT
WKX1	A, D, L, AA, MM	0V ± 0.1V
	H	+15V ± 5%
	P	+6.4V ± 5%
	W	-15V ± 5%

Figure 2

PLUG	POINT	MEASUREMENT
WK5X4	A5, A6	0V ± 0.1V
WK5X5	B1, B3, B5	0V ± 0.1V
	B4	+6.4V ± 5%
	B2	+15V ± 5%
	B6	-15V ± 5%

Figure 3

PLUG	POINT	MEASUREMENT
WK5X1	B6	/V ± 0.1V
	B1	+6.4V ± 5%
	B10	+15V ± 5%
	B5	-15V ± 5%
WK5X2	A3	0V ± 0.1V
	B9	+6.4V ± 5%
	A10	+15V ± 5%
	A7	-15V ± 5%
WK5X3	A1	0V ± 0.1V
	B1	+15V ± 5%
	B8	-15V ± 5%
WK5X4	A5, A6	0V ± 5%
WK5X5	B1, B3, B5	0V ± 0.1V
	B4	+6.4V ± 5%
	B2	+15V ± 5%
	B6	-15V ± 5%

Figure 4

PLUG	POINT	MEASUREMENT
WK5X1	A6	0V ± 0.1V
	B1	+6.4V ± 5%
	B10	+15V ± 5%
	B5	-15V ± 5%

* NOTE

Also check continuity to cable for plug WKX2.

LOOP F1: CAMERA INPUT SUPPLY VOLTAGES (Cont.)

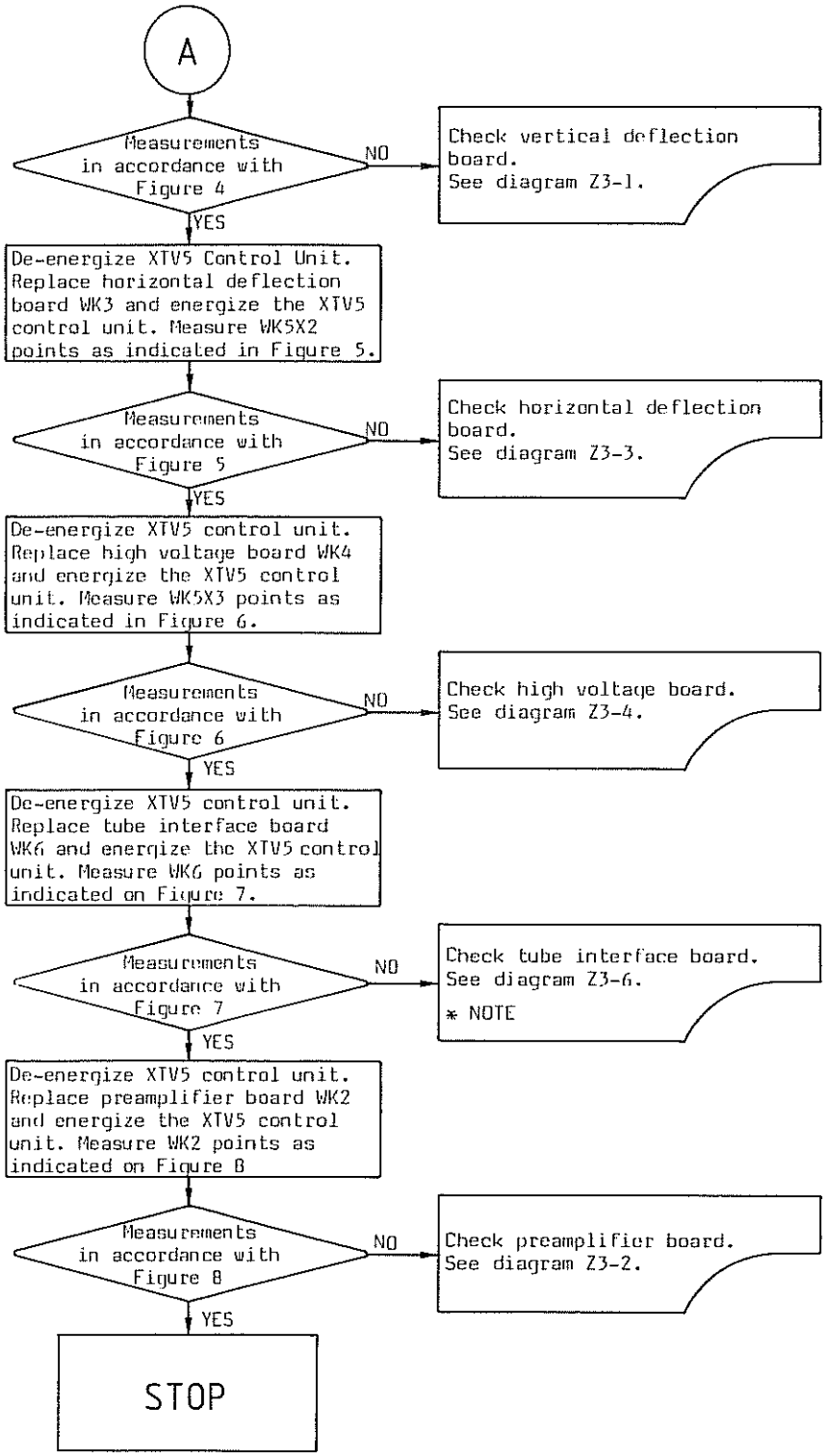

A
Measurements in accordance with Figure 4
NO
Check vertical deflection board. See diagram Z3-1.
YES
De-energize XTV5 Control Unit. Replace horizontal deflection board WK3 and energize the XTV5 control unit. Measure WK5X2 points as indicated in Figure 5.
Measurements in accordance with Figure 5
NO
Check horizontal deflection board. See diagram Z3-3.
YES
De-energize XTV5 control unit. Replace high voltage board WK4 and energize the XTV5 control unit. Measure WK5X3 points as indicated in Figure 6.
Measurements in accordance with Figure 6
NO
Check high voltage board. See diagram Z3-4.
YES
De-energize XTV5 control unit. Replace tube interface board WK6 and energize the XTV5 control unit. Measure WK6 points as indicated on Figure 7.
Measurements in accordance with Figure 7
NO
Check tube interface board. See diagram Z3-6.
* NOTE
YES
De-energize XTV5 control unit. Replace preamplifier board WK2 and energize the XTV5 control unit. Measure WK2 points as indicated on Figure 8
Measurements in accordance with Figure 8
NO
Check preamplifier board. See diagram Z3-2.
YES
STOP

Figure 5

PLUG	POINT	MEASUREMENT
WK5X2	A3	0V ± 0.1V
	B9	+6.4V ± 5%
	A10	+15V ± 5%
	A7	-15V ± 5%

Figure 6

PLUG	POINT	MEASUREMENT
WK5X3	A1	0V ± 0.1V
	B1	+15V ± 5%
	B8	-15V ± 5%

Figure 7

PLUG	POINT	MEASUREMENT
WK6X1	B10	0V ± 0.1V
WK6X2	A1	0V ± 0.1V
	B6	+6.4V ± 5%
	A1	+15V ± 5%
	B3	-15V ± 5%
WK6X3	B1, A1, MP10 thru MP19	0V ± 0.1V
	A5	+15V ± 0.1V
	B3, A3	-15V ± 5%

* NOTE

Also check continuity in chasis wiring between MP10, MP12, MP15, and MP19 to chassis points 3, 4, 2 and 1; respectively.

Figure 8

PLUG	POINT	MEASUREMENT
WK2X1	A1, B1	0V ± 0.1V
	A5, B5	+15V ± 5%
	A3, B3	-15V ± 5%

LOOP F2: H-, V-, AND COMBI PULSE SUPPLY

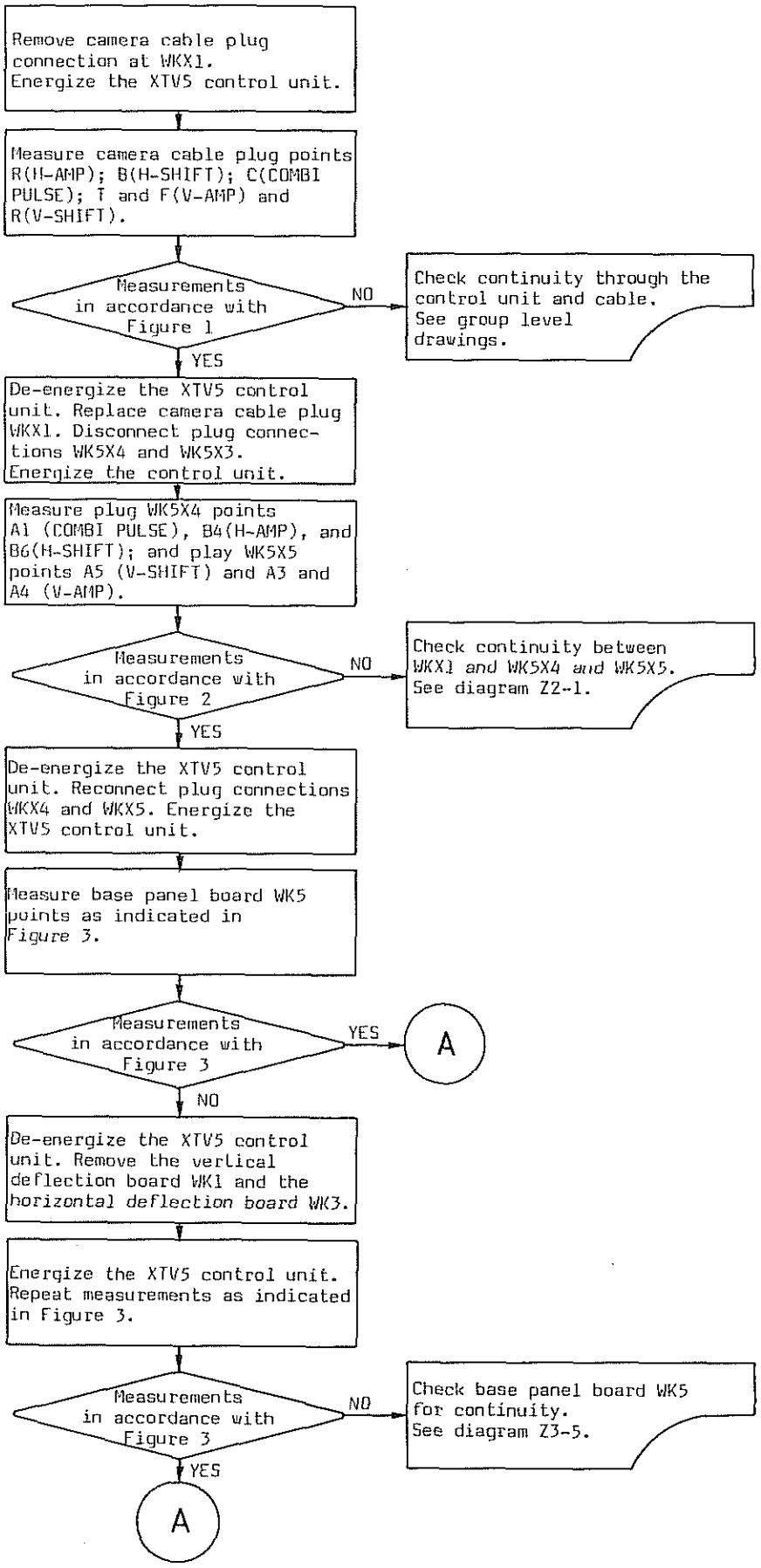

Remove camera cable plug connection at WKX1. Energize the XTV5 control unit.
Measure camera cable plug points R(H-AMP); B(H-SHIFT); C(COMBI PULSE); T and F(V-AMP) and R(V-SHIFT).
Measurements in accordance with Figure 1
NO
Check continuity through the control unit and cable. See group level drawings.
YES
De-energize the XTV5 control unit. Replace camera cable plug WKX1. Disconnect plug connections WK5X4 and WK5X3. Energize the control unit.
Measure plug WK5X4 points A1 (COMBI PULSE), B4(H-AMP), and B6(H-SHIFT); and play WK5X5 points A5 (V-SHIFT) and A3 and A4 (V-AMP).
Measurements in accordance with Figure 2
NO
Check continuity between WKX1 and WK5X4 and WK5X5. See diagram Z2-1.
YES
De-energize the XTV5 control unit. Reconnect plug connections WKX4 and WKX5. Energize the XTV5 control unit.
Measure base panel board WK5 points as indicated in Figure 3.
Measurements in accordance with Figure 3
YES
A
NO
De-energize the XTV5 control unit. Remove the verlical deflection board WK1 and the horizontal deflection board WK3.
Energize the XTV5 control unit. Repeat measurements as indicated in Figure 3.
Measurements in accordance with Figure 3
NO
Check base panel board WK5 for continuity. See diagram Z3-5.
YES
A

Figure 1

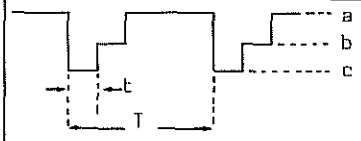
PLUG	POINT	MEASUREMENT
WKX1	R	0.9 mA to 150 -185 mA
	B	-1.5V ± 0.7V to +9.3V ± 1V
	C	 a = +5.5V ± 0.2V b = +2V ± 0.2V c = -0.7V ± 0.2V t = 6 µsec(50Hz); 7 µsec(60Hz) T = 32 µsec
	T, F	-10V ± 0.1 to +10V ± 0.1V
	K	0V ± 0.1V to +10V ± 0.1V

Figure 2

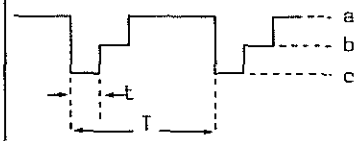
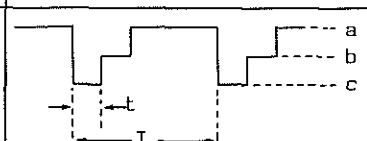
PLUG	POINT	MEASUREMENT
WKX4	A1	 a = +5.5V ± 0.2V b = +2V ± 0.2V c = -0.7V ± 0.2V t = 6 µsec(50Hz); 7 µsec(60Hz) T = 32 µsec
	B4	0.9 mA to 150 - 185 mA
	B6	-9.5V to 0.7V to +9.3V ± 1V
WK5X5	A5	0V ± 0.1V to 10V ± 0.1V
	A3, A4	-10V ± 0.1V to +10V ± 0.1V

Figure 3

PLUG	POINT	MEASUREMENT
WK5X1	B8	0V ± 0.1V to +10V ± 0.1V
	A9, R5	-10V ± 8.1V to +10V ± 0.1V
	B3	 a = +5.5V ± 0.2V b = +2V ± 0.2V c = -0.7V ± 0.2V t = 6 µsec(50Hz); 7 µsec(60Hz) T = 32 µsec

LOOP F2: H-, V-, AND COMBI PULSE SUPPLY (Cont.)

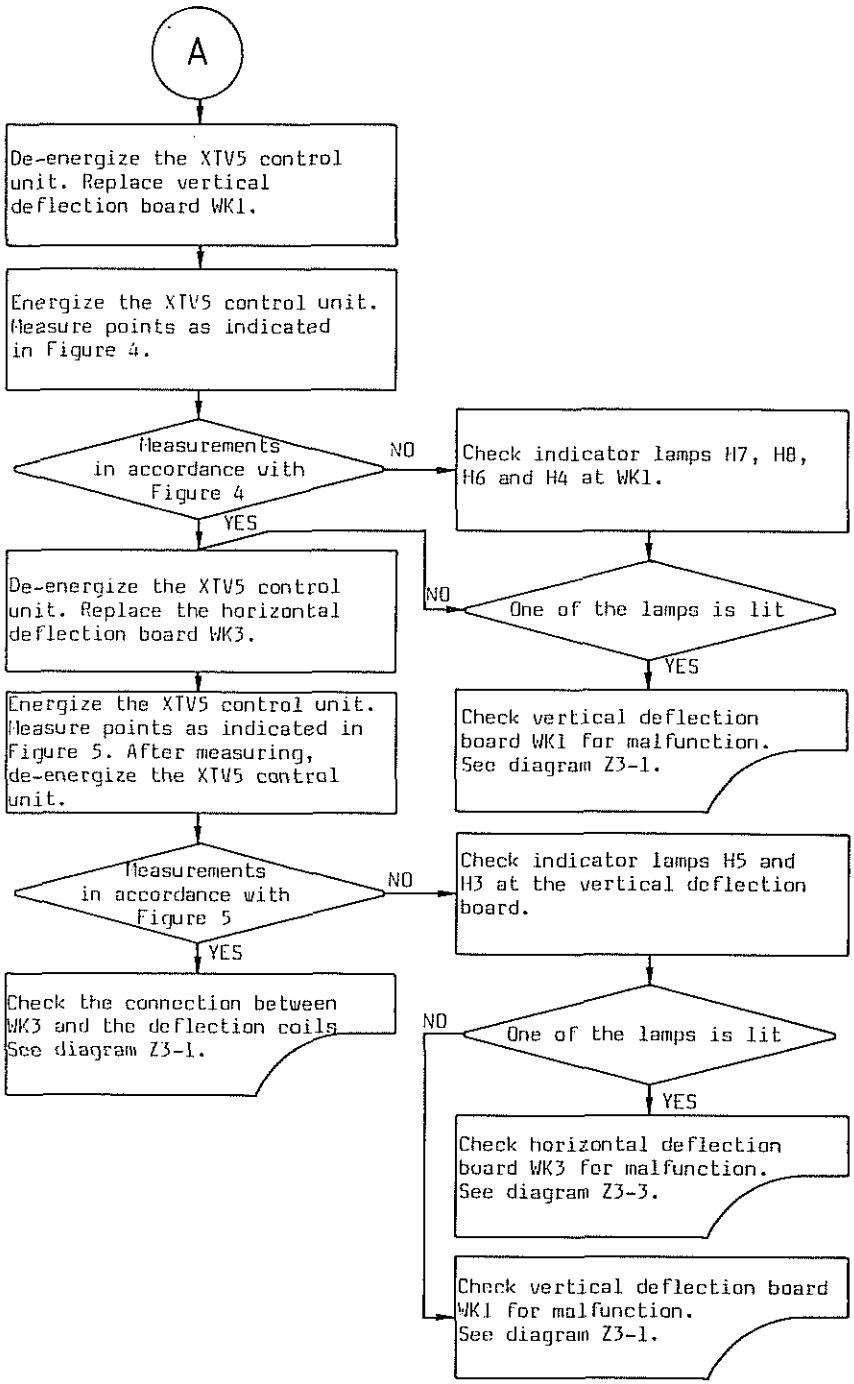

A
De-energize the XTV5 control unit. Replace vertical deflection board WK1.
Energize the XTV5 control unit. Measure points as indicated in Figure 4.
Measurements in accordance with Figure 4
NO
YES
Check indicator lamps H7, H8, H6 and H4 at WK1.
One of the lamps is lit
NO
YES
De-energize the XTV5 control unit. Replace the horizontal deflection board WK3.
Check vertical deflection board WK1 for malfunction. See diagram Z3-1.
Energize the XTV5 control unit. Measure points as indicated in Figure 5. After measuring, de-energize the XTV5 control unit.
Measurements in accordance with Figure 5
NO
YES
Check indicator lamps H5 and H3 at the vertical deflection board.
Check the connection between WK3 and the deflection coils See diagram Z3-1.
One of the lamps is lit
NO
YES
Check horizontal deflection board WK3 for malfunction. See diagram Z3-3.
Check vertical deflection board WK1 for malfunction. See diagram Z3-1.

Figure 3 (Cont.)

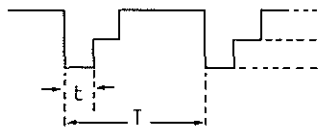
PLUG	POINT	MEASUREMENT
WK5X2	B4	0.9 mA to 150-185 mA
	B8	-9.5V ± 0.7V to +9.3V ± 1V
	A5	 a = 15.5V ± 0.2V b = +2V ± 0.2V c = -0.7V ± 0.2V t = 6 µsec(50Hz), 7 µsec(60Hz) T = 32 µsec
WK1X1	B8	0V ± 0.1V to +10V ± 0.1V
	A9, A5	-10V ± 0.1V to +10V ± 0.1V
	B3	Same as WK5X2:A5
WK3X1	B8	+1V ± 0.1V to -1V ± 0.1V
	B4	-15V ± 0.1V to +5V ± 0.1V
WK3X2	A5	Same as WK5X2:A5

Figure 4

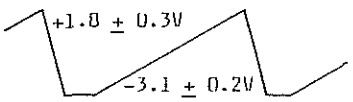
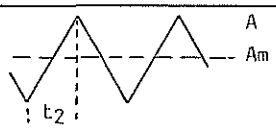
PLUG	POINT	MEASUREMENT
WK1X2	B4	+4.1V ± 0.4V -8.0V ± 0.8V U(X1:A5) = -10V ± 0.1V U(X1:B8) ± 0V 62 Ω, 1%, P 1W between (X1:A4) and (X1:B4)
	A4	 +1.8 ± 0.3V -3.1 ± 0.2V U(X1:A5) = -10V ± 0.1V U(X1:B8) ± 0V
	B2, B10	Same as WK1X1:B4
	A1, A10	Same as WK1X1:A4

Figure 5

PLUG	POINT	MEASUREMENT
WK7X2	B7	 A Am t_2 A = 430 mA ± 15% $A_m = \frac{U(X1:B8)}{37.9}$ ± 10% if L1 = 26.5mA/V $A_m = \frac{U(X1:B8)}{16.8}$ ± 10% if L1 = 62.5mA/V t_2= line frequency dependent
	A5	0V ± 0.1V

LOOP F3: CAMERA IMAGE TUBE SUPPLIES

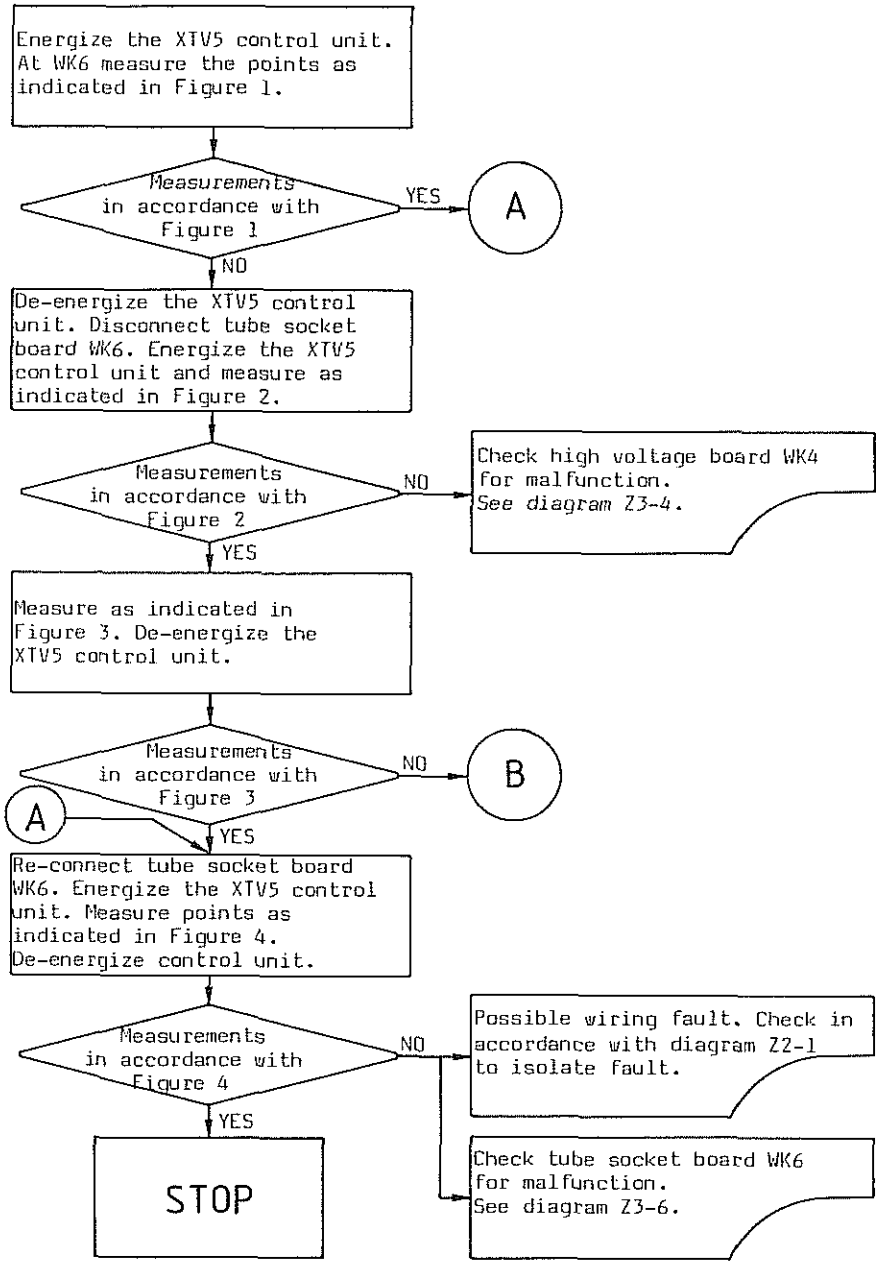

Energize the XTV5 control unit. At WK6 measure the points as indicated in Figure 1.
Measurements in accordance with Figure 1
YES
A
NO
De-energize the XTV5 control unit. Disconnect tube socket board WK6. Energize the XTV5 control unit and measure as indicated in Figure 2.
Measurements in accordance with Figure 2
NO
Check high voltage board WK4 for malfunction. See diagram Z3-4.
YES
Measure as indicated in Figure 3. De-energize the XTV5 control unit.
Measurements in accordance with Figure 3
NO
B
A
YES
Re-connect tube socket board WK6. Energize the XTV5 control unit. Measure points as indicated in Figure 4. De-energize control unit.
Measurements in accordance with Figure 4
NO
Possible wiring fault. Check in accordance with diagram Z2-1 to isolate fault.
YES
STOP
Check tube socket board WK6 for malfunction. See diagram Z3-6.

Figure 1

PLUG	POINTS	MEASUREMENT
WK6X1	B7	+300V ± 5%
	B4	+600V ± 5%
	A1	+920V ± 5%
WK6X2	A10	-114.5V ± 1.5V
	B5	-10V ± 0.1V to +10V ± 0.1V

Figure 2

PLUG	POINTS	MEASUREMENT
WK4X2	B7	+300V ± 5%
	B4	+600V ± 5%
	A1	+920V ± 5%

Figure 3

PLUG	POINTS	MEASUREMENT
WK1X2	A10	-114.5V ± 1.5V
	B5	-10V ± 0.1V to +10V ± 0.1V

Figure 4

PLUG	POINTS	MEASUREMENT
WK6	5	+300V ± 5%
	6	+600V ± 5%
	3	+920V ± 5%
	2	-114.5V ± 1.5V
	7	-10V ± 0.1V to +10V ± 0.1V

Figure 5

PLUG	POINTS	MEASUREMENT
WKX1		0V to -10V ± 0.1V
	5	-10V ± 0.1V to +10V ± 0.1V

LOOP F3: CAMERA IMAGE TUBE SUPPLIES (Cont.)

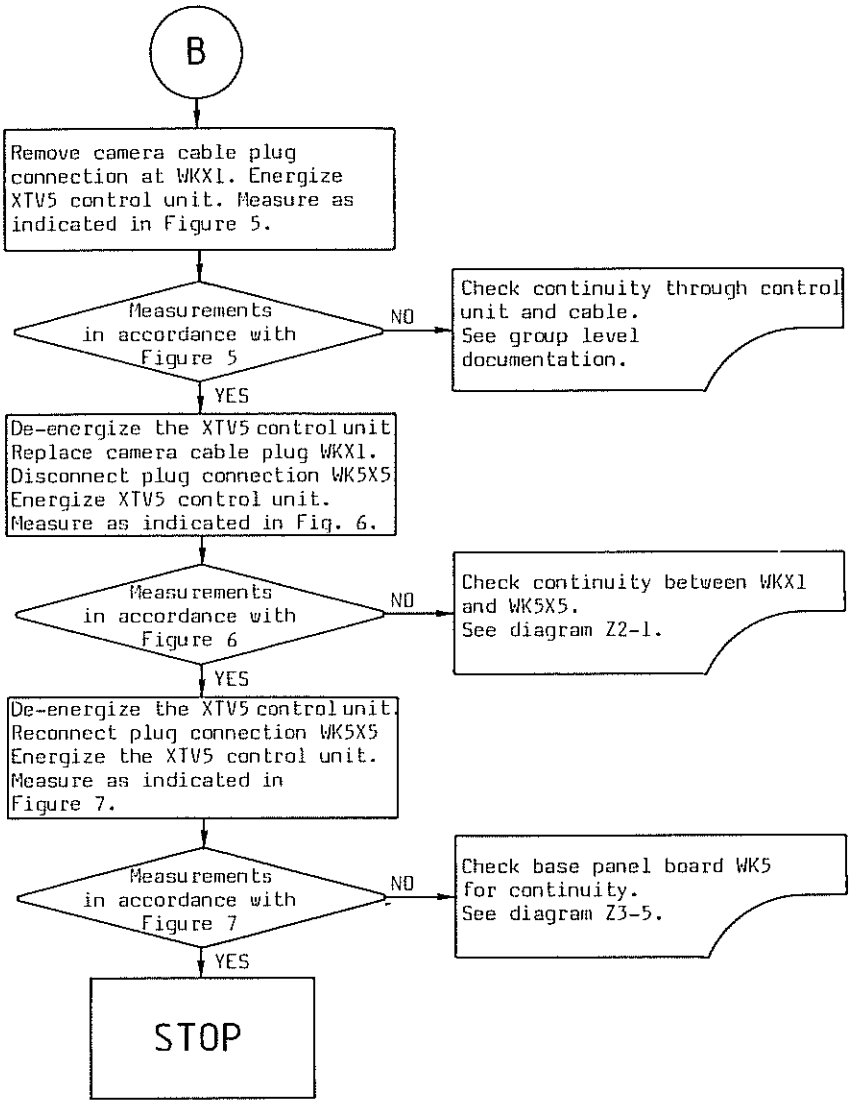

B
Remove camera cable plug connection at WKX1. Energize XTV5 control unit. Measure as indicated in Figure 5.
Measurements in accordance with Figure 5
NO
Check continuity through control unit and cable. See group level documentation.
YES
De-energize the XTV5 control unit Replace camera cable plug WKX1. Disconnect plug connection WK5X5 Energize XTV5 control unit. Measure as indicated in Fig. 6.
Measurements in accordance with Figure 6
NO
Check continuity between WKX1 and WK5X5. See diagram Z2-1.
YES
De-energize the XTV5 control unit. Reconnect plug connection WK5X5 Energize the XTV5 control unit. Measure as indicated in Figure 7.
Measurements in accordance with Figure 7
NO
Check base panel board WK5 for continuity. See diagram Z3-5.
YES
STOP

Figure 6

PLUG	POINTS	MEASUREMENT
WKX5	A1	0V to -10V ± 0.1V
	A6	-10V ± 0.1V to +10V ± 0.1V

Figure 7

PLUG	POINTS	MEASUREMENT
WK5X1	B7	0V to -10V ± 0.1V
	B9	-10V ± 0.1V to +10V ± 0.1V

LOOP F4: FOCUS AND ALIGNMENT

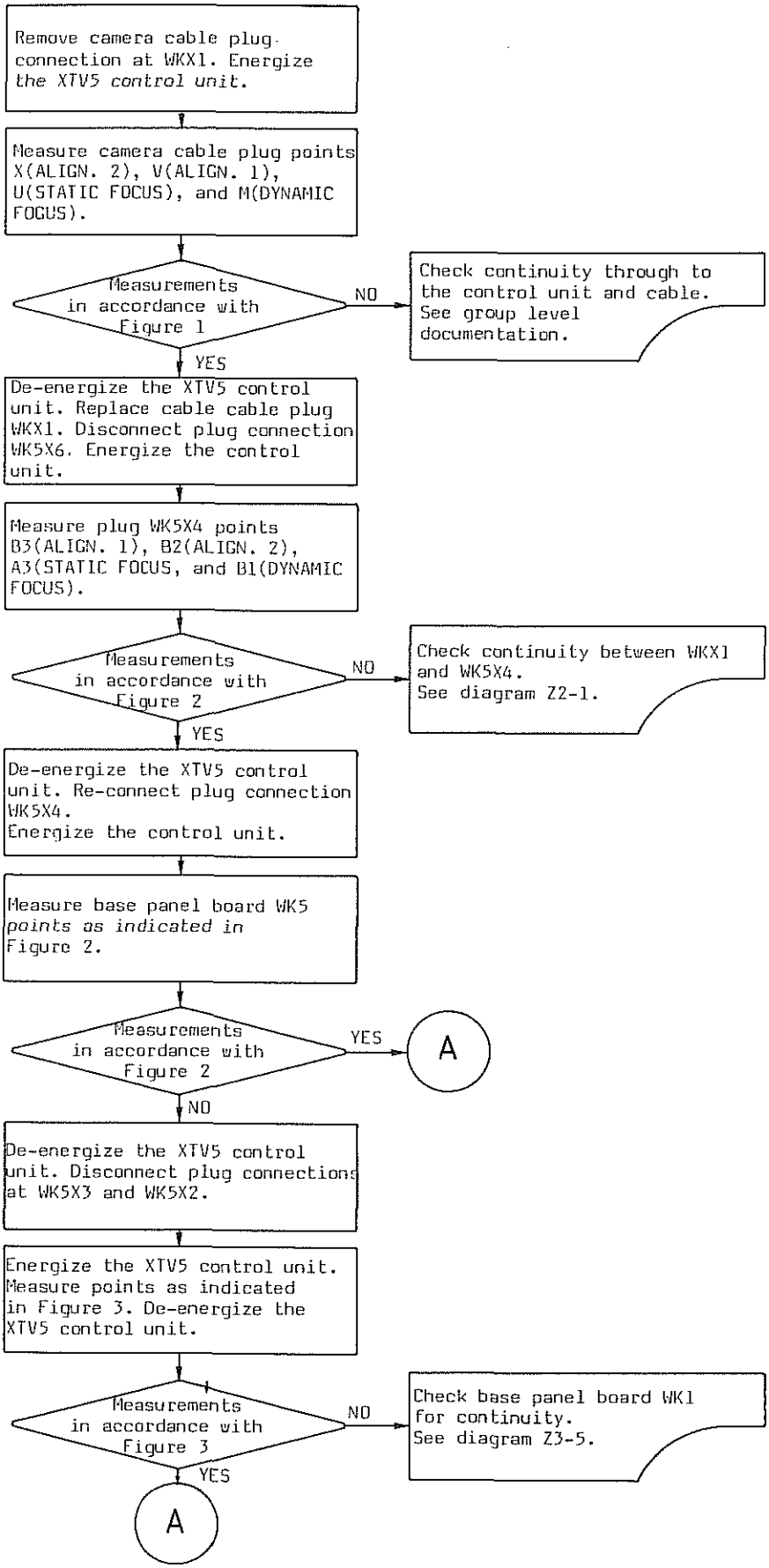

Remove camera cable plug connection at WKX1. Energize the XTV5 control unit.
Measure camera cable plug points X(ALIGN. 2), V(ALIGN. 1), U(STATIC FOCUS), and M(DYNAMIC FOCUS).
Measurements in accordance with Figure 1
NO
Check continuity through to the control unit and cable. See group level documentation.
YES
De-energize the XTV5 control unit. Replace cable cable plug WKX1. Disconnect plug connection WK5X6. Energize the control unit.
Measure plug WK5X4 points B3(ALIGN. 1), B2(ALIGN. 2), A3(STATIC FOCUS, and B1(DYNAMIC FOCUS).
Measurements in accordance with Figure 2
NO
Check continuity between WKX1 and WK5X4. See diagram Z2-1.
YES
De-energize the XTV5 control unit. Re-connect plug connection WK5X4. Energize the control unit.
Measure base panel board WK5 points as indicated in Figure 2.
Measurements in accordance with Figure 2
YES
A
NO
De-energize the XTV5 control unit. Disconnect plug connections at WK5X3 and WK5X2.
Energize the XTV5 control unit. Measure points as indicated in Figure 3. De-energize the XTV5 control unit.
Measurements in accordance with Figure 3
NO
Check base panel board WK1 for continuity. See diagram Z3-5.
YES
A

Figure 1

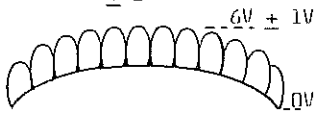
PLUG	POINT	MEASUREMENT
WKX1	X	+10V ± 0.1V to -10V ± 0.1V
	V	+10V ± 0.1V to -10V ± 0.1V
	U	81 to 94mA to 148 to 179mA
	M	0V to 6V ± 1V 

Figure 2

PLUG	POINT	MEASUREMENT
WK5X4	B3	+10V ± 0.1V to -10V ± 0.1V
	B2	+10V ± 0.1V to -10V ± 0.1V
	A3	81 to 94mA to 148 to 179mA
	B1	Same as WKX1:M, Figure 1.

Figure 3

PLUG	POINT	MEASUREMENT
WK5X2	B3	+10V ± 0.1V to -10V ± 0.1V
	B1	+10V ± 0.1V to -10V ± 0.1V
	A2	81 to 94mA to 148 to 179mA
WK5X3	B3	Same as WKX1: M

LOOP F4: FOCUS AND ALIGNMENT (Cont.)

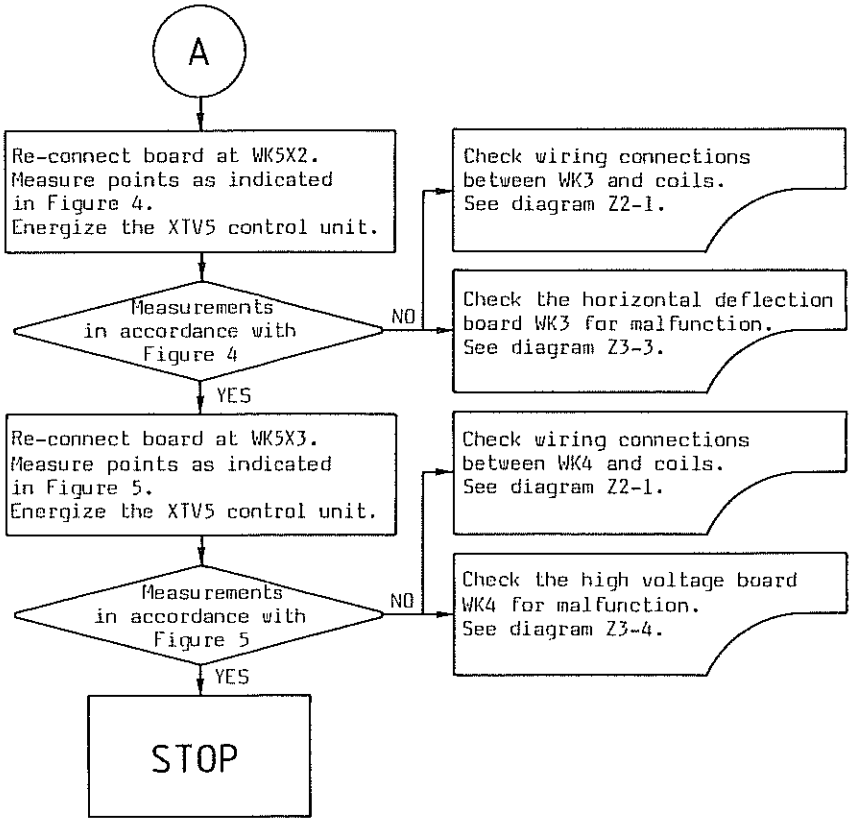


Figure 4

PLUG	POINT	MEASUREMENT
WK3X2	B1	V(X2:B1)= 0.45V (X1:B3) ± 5%
	A1	V(X2:A1)= V(X1:B3) ± 5%
	B2	V(X2:B2)= 0.45V (X1:B1) ± 5%
	A2	V(X2:A2)= V(X1:B1) ± 5%
	B3	0.1Ω across (X2:B3) and (X1:A2)
WK3X1	A2	0.1Ω acorss (X2:B3) and (X1:A2)

Figure 5

PLUG	POINT	MEASUREMENT
WK4X1	B3	

LOOP F5: VIDEO

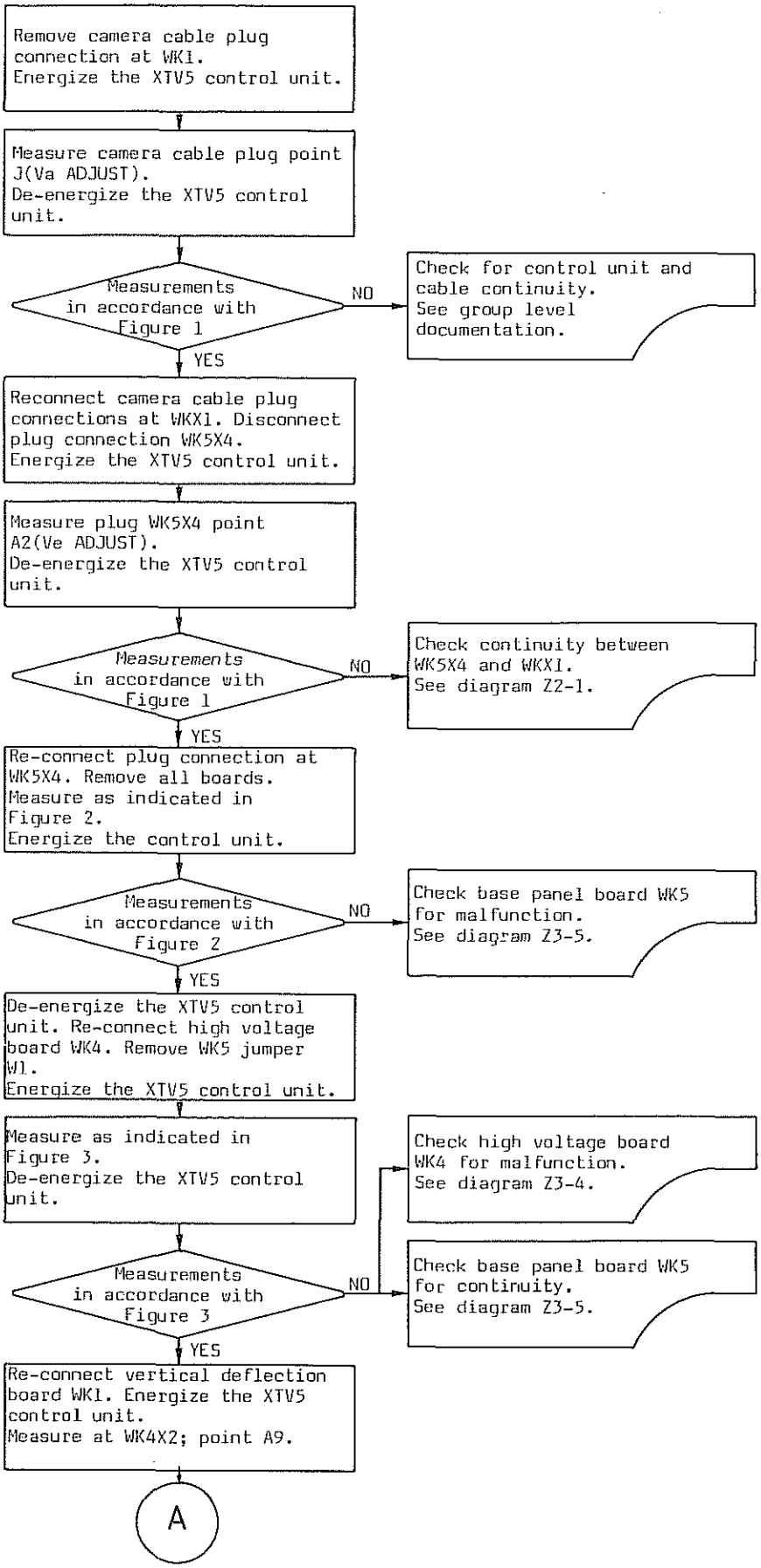

Remove camera cable plug connection at WK1. Energize the XTV5 control unit.
Measure camera cable plug point J(Va ADJUST). De-energize the XTV5 control unit.
Measurements in accordance with Figure 1
NO
Check for control unit and cable continuity. See group level documentation.
YES
Reconnect camera cable plug connections at WKX1. Disconnect plug connection WK5X4. Energize the XTV5 control unit.
Measure plug WK5X4 point A2(Ve ADJUST). De-energize the XTV5 control unit.
Measurements in accordance with Figure 1
NO
Check continuity between WK5X4 and WKX1. See diagram Z2-1.
YES
Re-connect plug connection at WK5X4. Remove all boards. Measure as indicated in Figure 2. Energize the control unit.
Measurements in accordance with Figure 2
NO
Check base panel board WK5 for malfunction. See diagram Z3-5.
YES
De-energize the XTV5 control unit. Re-connect high voltage board WK4. Remove WK5 jumper W1. Energize the XTV5 control unit.
Measure as indicated in Figure 3. De-energize the XTV5 control unit.
Check high voltage board WK4 for malfunction. See diagram Z3-4.
Measurements in accordance with Figure 3
NO
Check base panel board WK5 for continuity. See diagram Z3-5.
YES
Re-connect vertical deflection board WK1. Energize the XTV5 control unit. Measure at WK4X2; point A9.
A

Figure 1

PLUG	POINT	MEASUREMENT
WKX1	J	0V to 80V ± 5%
WKX4	A2	0V to 80V ± 5%

Figure 2

PLUG	POINT	MEASUREMENT
WK5X4	A2	0V to 80V ± 5%
WK5X3	B7	0V to 80V ± 5%

Figure 3

PLUG	POINT	MEASUREMENT
WK5X3	B6	20.5V (X1:B7) ± 5% limited to 83V ± 5%
WK5W1	1	

Figure 4

PLUG	POINT	MEASUREMENT
WK4X2	A9	20.5V (X1:B7) ± 5% limited to 83V ± 5%

LOOP F5: VIDEO (Cont.)

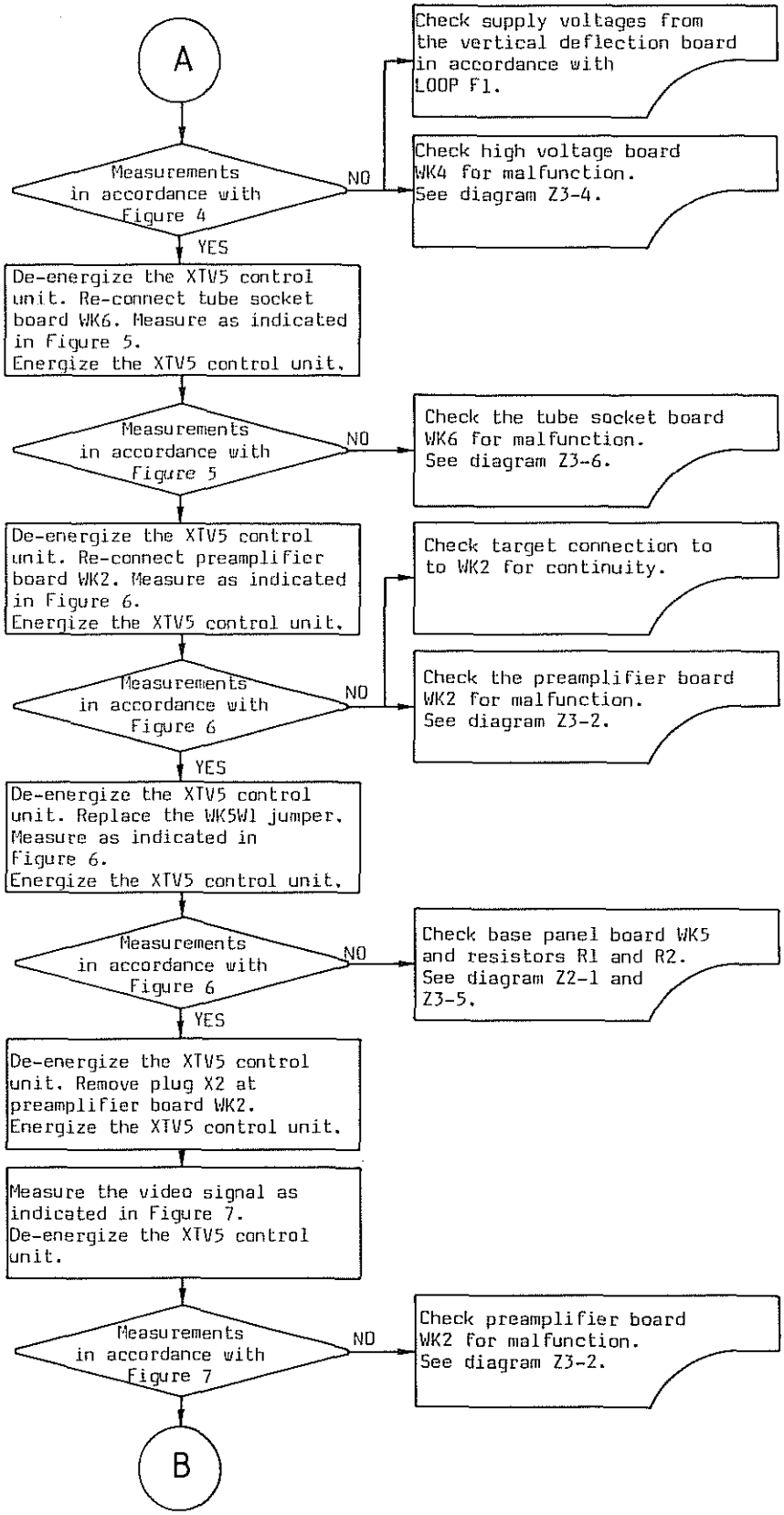

A
Measurements in accordance with Figure 4
NO
YES
Check supply voltages from the vertical deflection board in accordance with LOOP F1.
Check high voltage board WK4 for malfunction. See diagram Z3-4.
De-energize the XTV5 control unit. Re-connect tube socket board WK6. Measure as indicated in Figure 5. Energize the XTV5 control unit.
Measurements in accordance with Figure 5
NO
Check the tube socket board WK6 for malfunction. See diagram Z3-6.
De-energize the XTV5 control unit. Re-connect preamplifier board WK2. Measure as indicated in Figure 6. Energize the XTV5 control unit.
Check target connection to to WK2 for continuity.
Measurements in accordance with Figure 6
NO
Check the preamplifier board WK2 for malfunction. See diagram Z3-2.
YES
De-energize the XTV5 control unit. Replace the WK5W1 jumper. Measure as indicated in Figure 6. Energize the XTV5 control unit.
Measurements in accordance with Figure 6
NO
Check base panel board WK5 and resistors R1 and R2. See diagram Z2-1 and Z3-5.
YES
De-energize the XTV5 control unit. Remove plug X2 at preamplifier board WK2. Energize the XTV5 control unit.
Measure the video signal as indicated in Figure 7. De-energize the XTV5 control unit.
Measurements in accordance with Figure 7
NO
Check preamplifier board WK2 for malfunction. See diagram Z3-2.
B

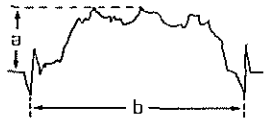
Figure 5

PLUG	POINT	MEASUREMENT
WK6X3	B10 A10	0V to 80V ± 5%
WK6X1	A9	20.5V (WK4X1:B7) ± 5% limited to 83V ± 5%

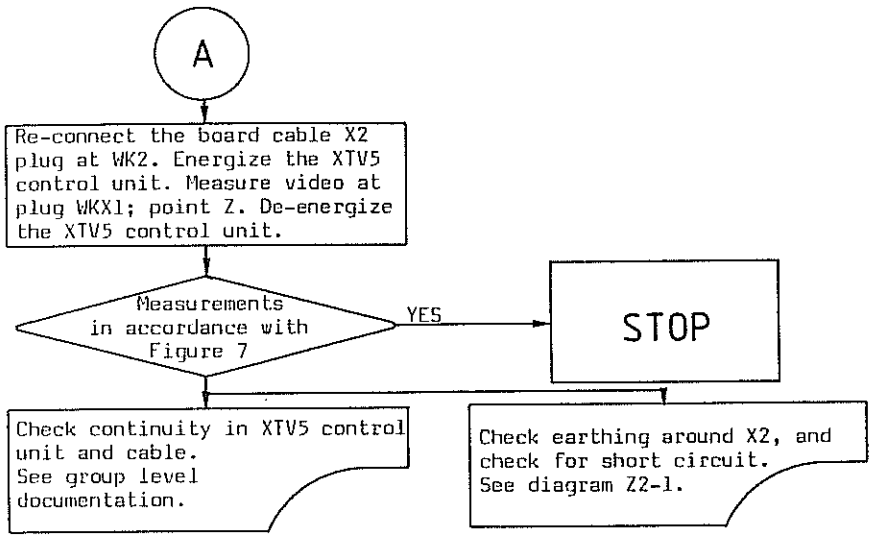
Figure 6

PLUG	POINT	MEASUREMENT
WK2X1	B10 A10	20.5V (WK4X1:B7) ± 5% limited to 83V ± 5%

Figure 7

PLUG	POINT	MEASUREMENT
WK2	X2	
WKX1	Z	a = 0V to 1200 mV b = line frequent

LOOP F5: VIDEO (Cont.)


A
Re-connect the board cable X2 plug at WK2. Energize the XTV5 control unit. Measure video at plug WKX1; point Z. De-energize the XTV5 control unit.
Measurements in accordance with Figure 7
YES
STOP
Check continuity in XTV5 control unit and cable. See group level documentation.
Check earthing around X2, and check for short circuit. See diagram Z2-1.

Section Z: DRAWINGS

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Vertical Deflection	Z3-1
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Horizontal Deflection	Z3-3
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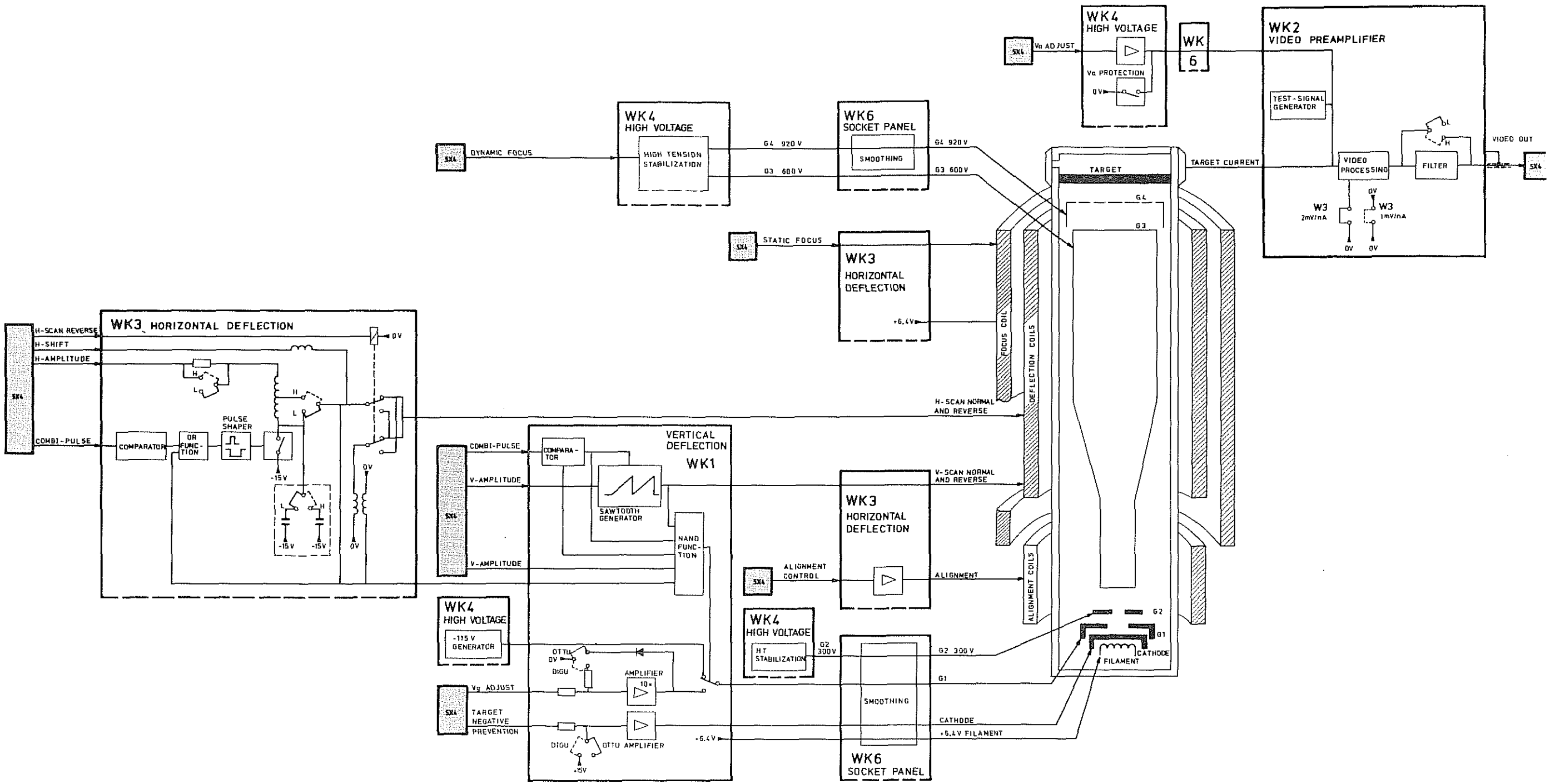
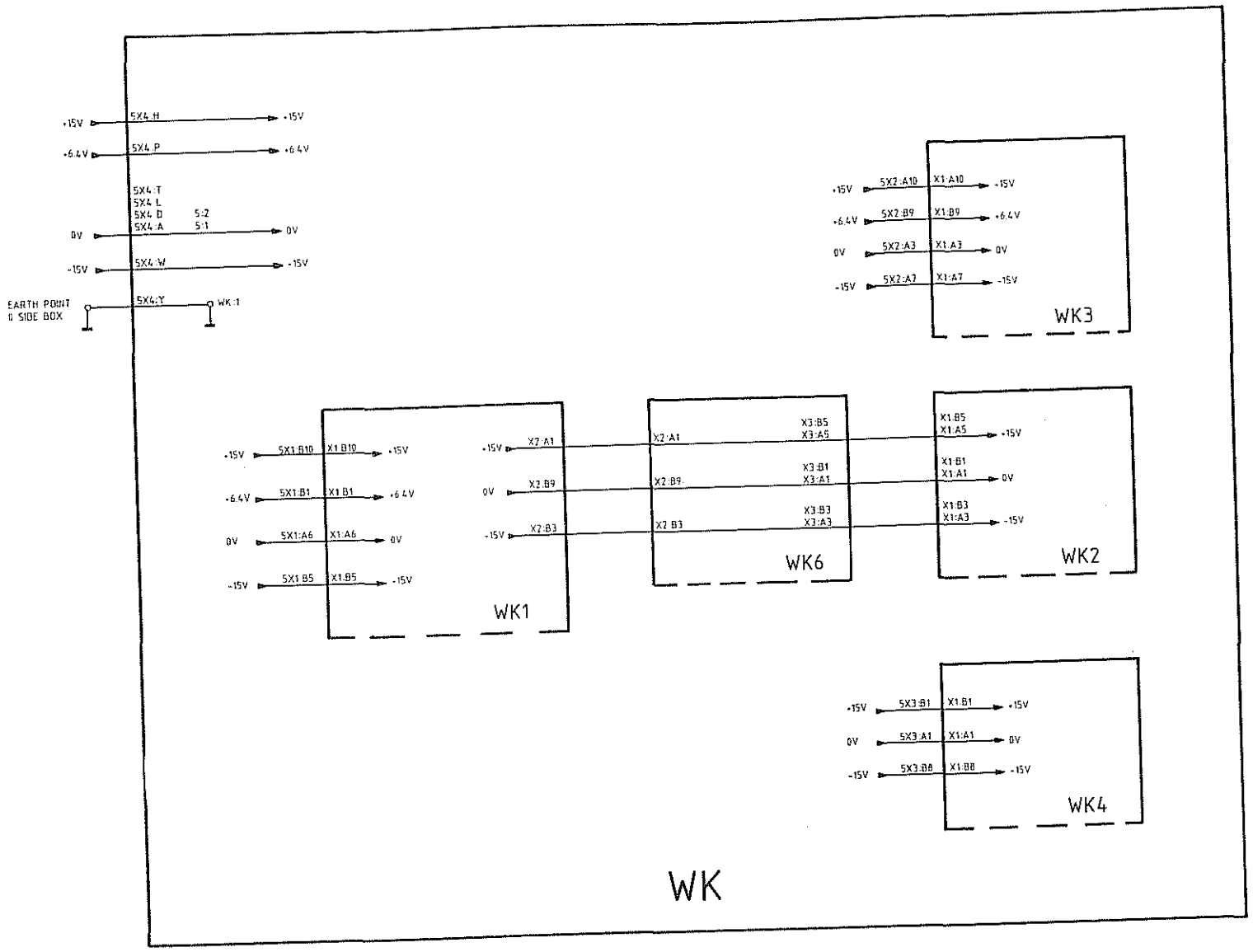


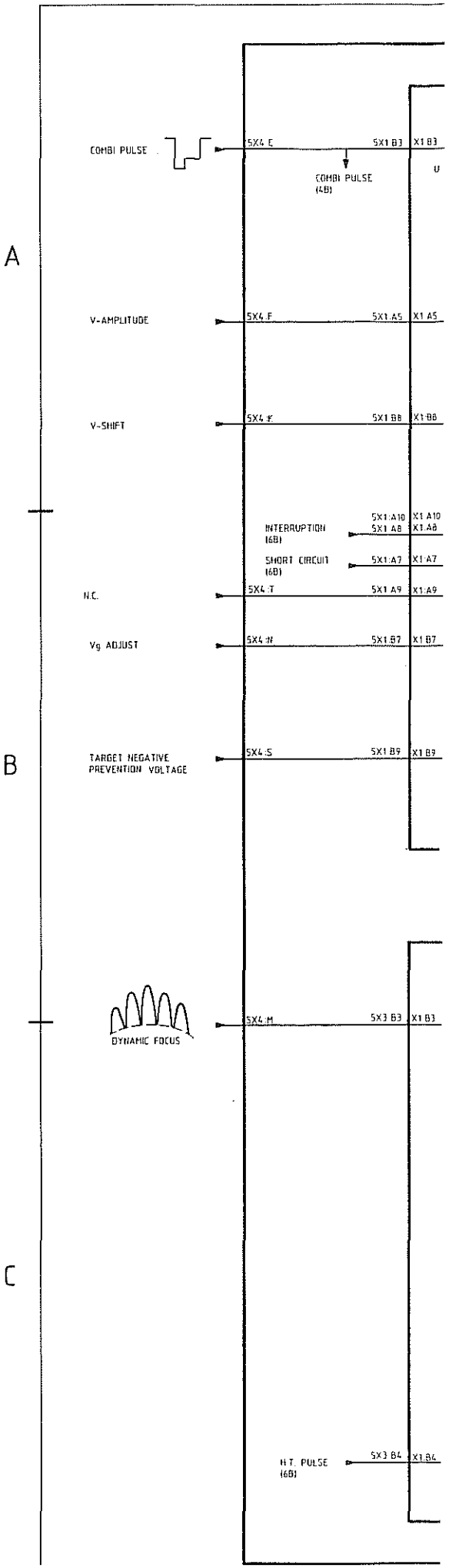
: CONTROL UNIT CONNECTION VIA CAMERA CABLE

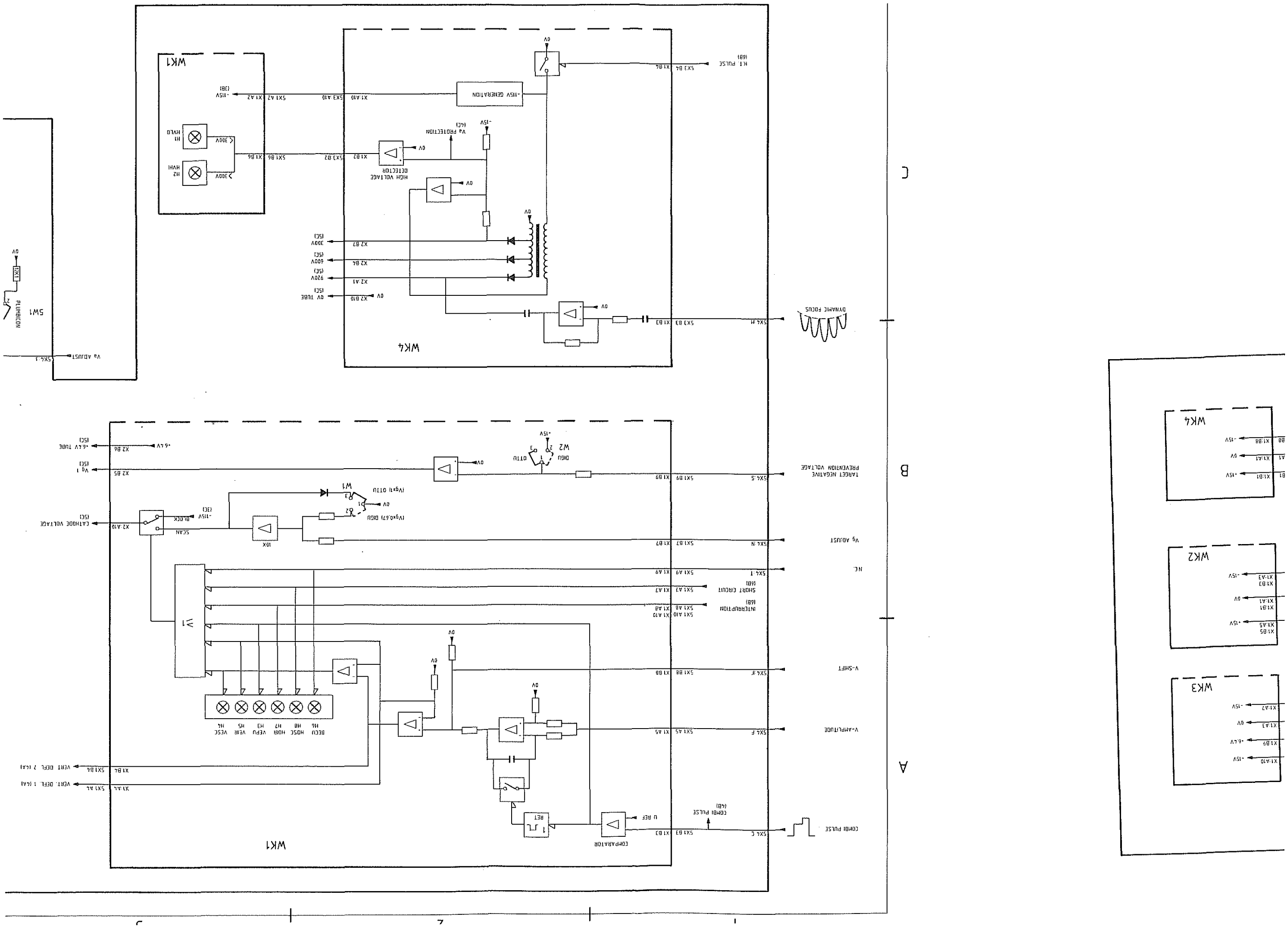
BLOCK DIAGRAM OF CAMERA XTV5

WK



XTV5-FB/HFB Camera




WK1
WK4
WK2
WK3
-15V GENERATION
HIGH VOLTAGE DETECTOR
Va PROTECTION
SHORT CIRCUIT
INTERRUPTION
COMPARATOR
DYNAMIC FOCUS
TARGET NEGATIVE PREVENTION VOLTAGE
Vg ADJUST
V-SHIFT
V-AMPLITUDE
COMBI PULSE
Va ADJUST
PLUMBICON
CATHODE VOLTAGE
VERT. DEFL. 1 (CA)
VERT DEFL. 2 (CA)
-6.4V TUBE
Vg 1
BECU
HDSC
HDR
VEPU
VEBR
VESC
J1
SW1
SW2
W1

XTV5-FB/HFB Camera

WK1

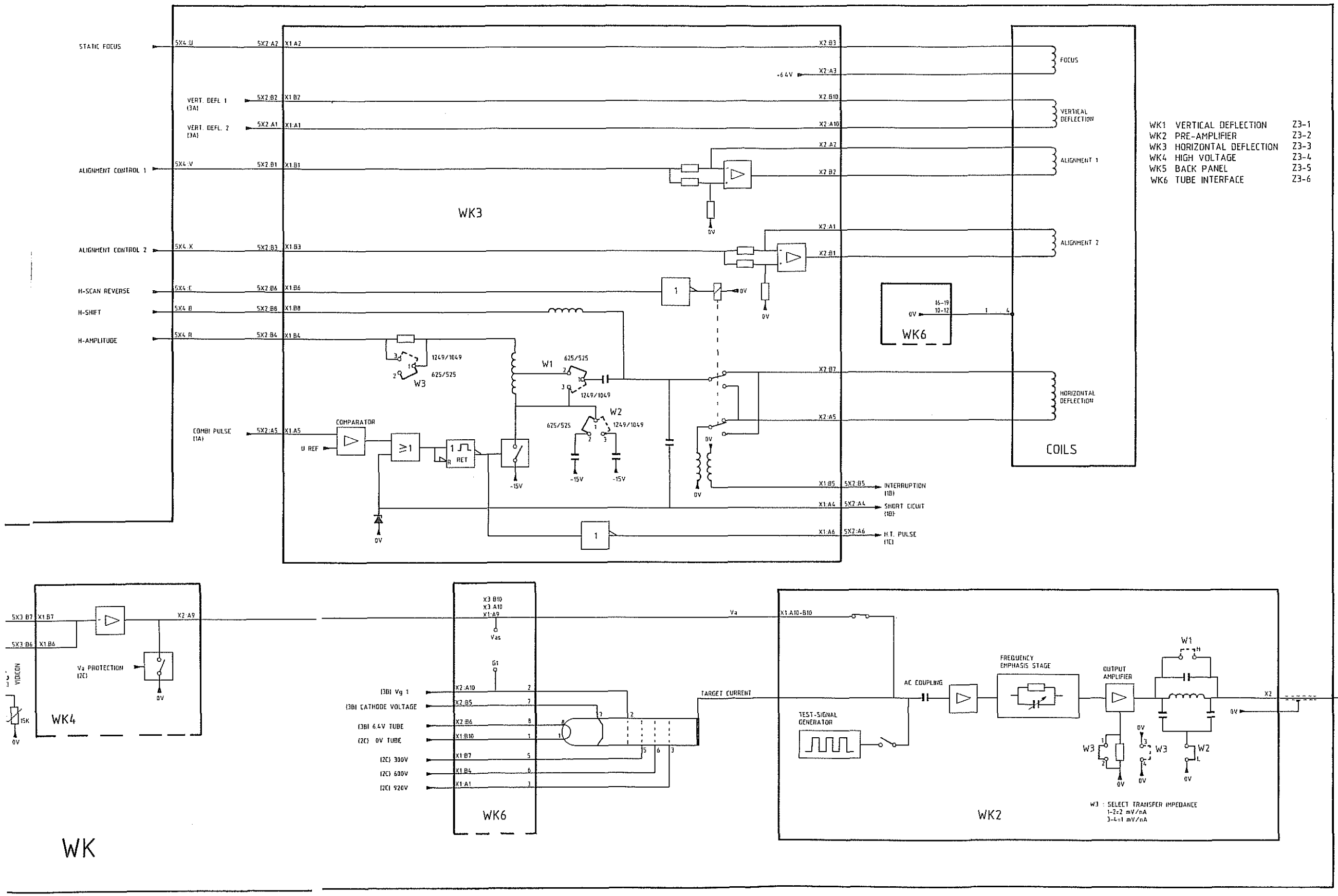
WK4

WK

WK6

WK3

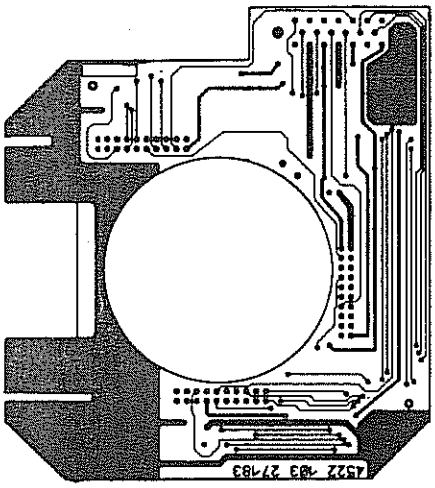
WK1



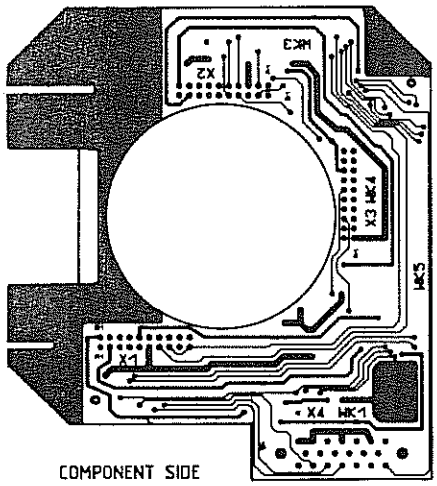
WK1 VERTICAL DEFLECTION Z3-1
WK2 PRE-AMPLIFIER Z3-2
WK3 HORIZONTAL DEFLECTION Z3-3
WK4 HIGH VOLTAGE Z3-4
WK5 BACK PANEL Z3-5
WK6 TUBE INTERFACE Z3-6

SIMPLIFIED CIRCUIT DIAGRAM OF CAMERA XTV5 WITH FIBER COUPLING

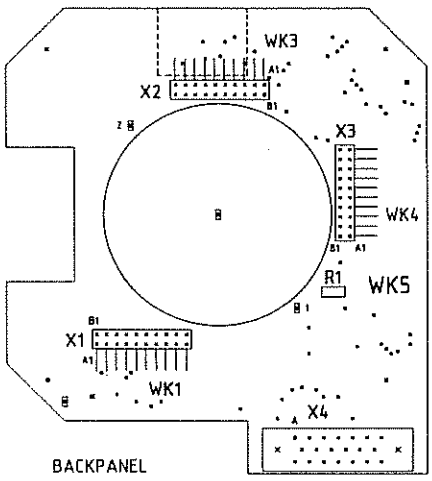
WK



NON COMPONENT SIDE



COMPONENT SIDE



BACKPANEL

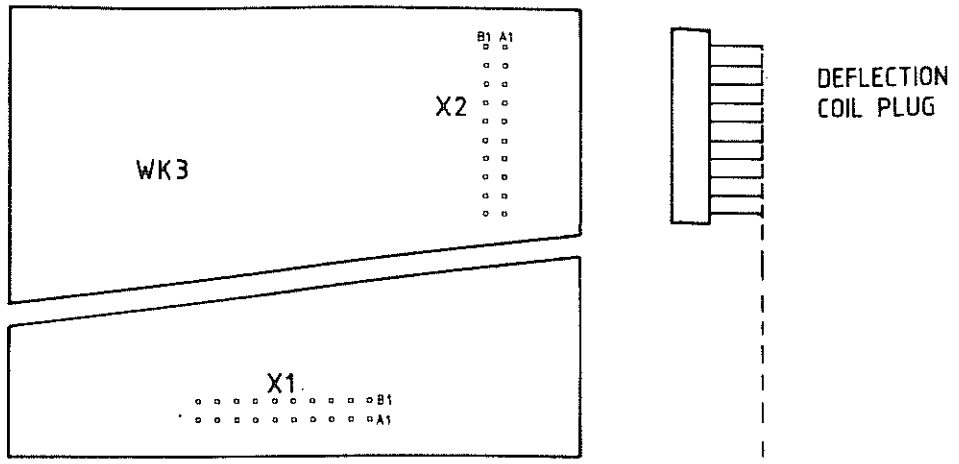
=WK5:1	0V
=WK5:2	0V
=WK5R1:1	IPSE
=WK5R1:2	0V
=WK5X4:A	0V
=WK5X4:B	HDSH
=WK5X4:C	CDPU
=WK5X4:D	0V
=WK5X4:E	SRHO--LC
=WK5X4:F	VEAH
=WK5X4:H	+15V
=WK5X4:J	FAVORG
=WK5X4:K	VESH
=WK5X4:L	0V
=WK5X4:M	DYFCRG
=WK5X4:N	VORGG1
=WK5X4:P	+0.4V
=WK5X4:R	HDAH
=WK5X4:S	FAVPVD
=WK5X4:T	0V
=WK5X4:U	STFC
=WK5X4:V	ALG1RG
=WK5X4:W	-15V
=WK5X4:X	ALG2RG
=WK5X1A:2	-115V
=WK5X1A:4	VESC2
=WK5X1A:5	VEAH
=WK5X1A:6	0V
=WK5X1A:7	SFHOSCLD
=WK5X1A:8	SFHOIRLD
=WK5X1A:10	SFHOIRLD

=WK5X1B:1	+0.4V
=WK5X1B:3	CDPU
=WK5X1B:4	VESC1
=WK5X1B:5	-15V
=WK5X1B:6	HVFA
=WK5X1B:7	VORGG1
=WK5X1B:8	VESH
=WK5X1B:9	FAVPVD
=WK5X1B:10	+15V
=WK5X2A:1	VESC1
=WK5X2A:2	STFC
=WK5X2A:3	0V
=WK5X2A:4	SFHOSCLD
=WK5X2A:5	CDPU
=WK5X2A:6	HVDR
=WK5X2A:7	-15V
=WK5X2A:10	+15V
=WK5X2B:1	ALG1RG
=WK5X2B:2	VESC2
=WK5X2B:3	ALG2RG
=WK5X2B:4	HDAH
=WK5X2B:5	SFHOIRLD
=WK5X2B:6	SRHO--LC
=WK5X2B:8	HDSH
=WK5X2B:9	+0.4V
=WK5X3A:1	0V
=WK5X3A:10	-115V
=WK5X3B:1	+15V
=WK5X3B:2	HVFA
=WK5X3B:3	DYFCRG
=WK5X3B:4	HVDR
=WK5X3B:6	IPSE
=WK5X3B:7	FAVORG
=WK5X3B:8	-15V

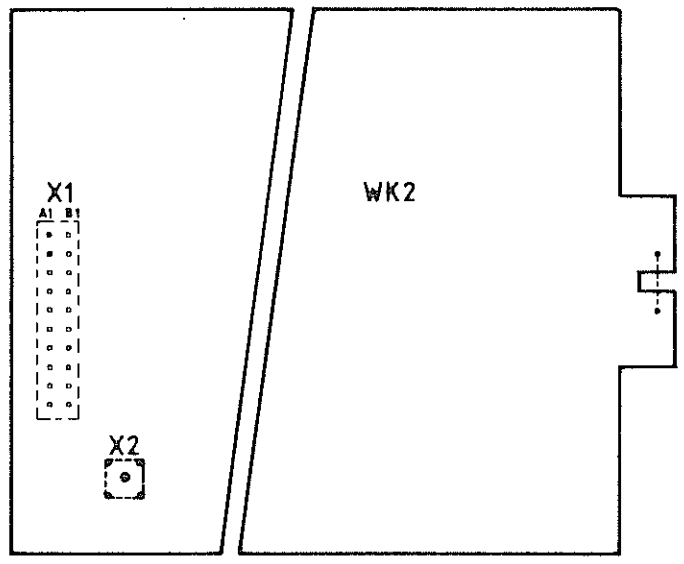
+15V	=WK5X1B:10	=WK5X2A:10	=WK5X3B:1	=WK5X4:H
+0.4V	=WK5X1B:1	=WK5X2B:9	=WK5X4:P	
-115V	=WK5X1A:2	=WK5X3A:10		
-15V	=WK5X1B:5	=WK5X2A:7	=WK5X3B:8	=WK5X4:W
ALG1RG	=WK5X2B:1	=WK5X4:V		
ALG2RG	=WK5X2B:3	=WK5X4:X		
CDPU	=WK5X1B:3	=WK5X2A:5	=WK5X4:C	
DYFCRG	=WK5X3B:3	=WK5X4:M		
HDAH	=WK5X2B:4	=WK5X4:R		
HDSH	=WK5X2B:8	=WK5X4:B		
HVDR	=WK5X2A:6	=WK5X3B:4		
HVFA	=WK5X1B:6	=WK5X3B:2		
SFHOIRLD	=WK5X1A:8	=WK5X1A:10	=WK5X2B:5	
SFHOSCLD	=WK5X1A:7	=WK5X2A:4		
SRHO--LC	=WK5X2B:6	=WK5X4:E		
STFC	=WK5X2A:2	=WK5X4:U		
FAVPVD	=WK5X1B:9	=WK5X4:S		
FAVORG	=WK5X3B:7	=WK5X4:J		
IPSE	=WK5X3B:6	=WK5R1:1		
VEAH	=WK5X1A:5	=WK5X4:F		
VESC1	=WK5X1B:4	=WK5X2A:1		
VESC2	=WK5X1A:4	=WK5X2B:2		
VESH	=WK5X1B:8	=WK5X4:K		
VORGG1	=WK5X1B:7	=WK5X4:N		
0V	=WK5X1A:6	=WK5X2A:3	=WK5X3A:1	=WK5X4:A =WK5X4:D
	=WK5X4:L	=WK5X4:T	=WK5R1:2	=WK5:1 =WK5:2

WIRING LIST OF BACKPANEL

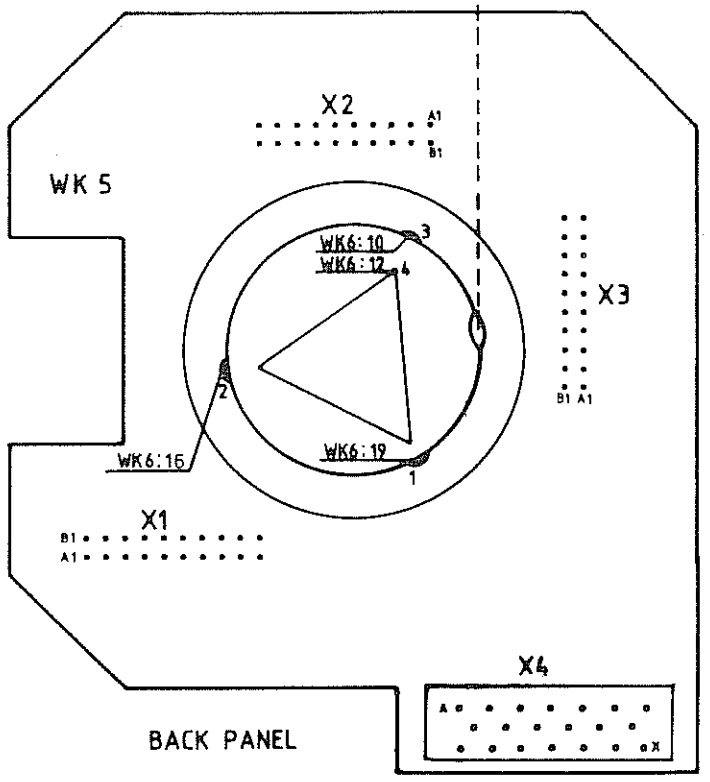
WK5



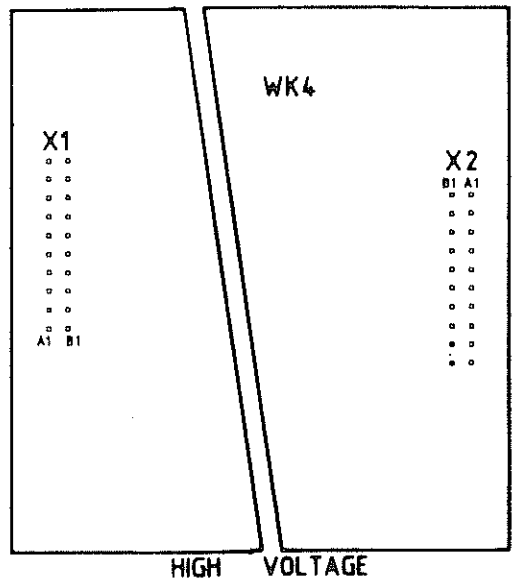
HORIZONTAL DEFLECTION



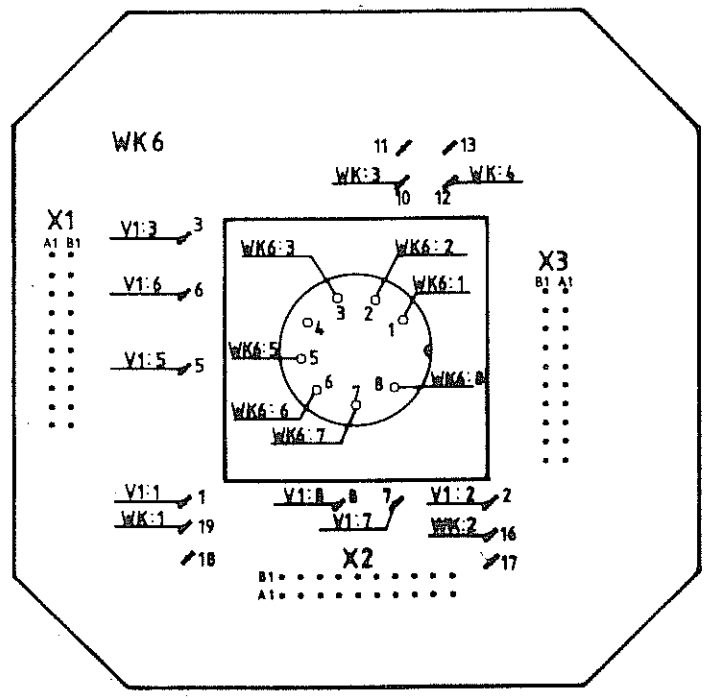
PREAMPLIFIER



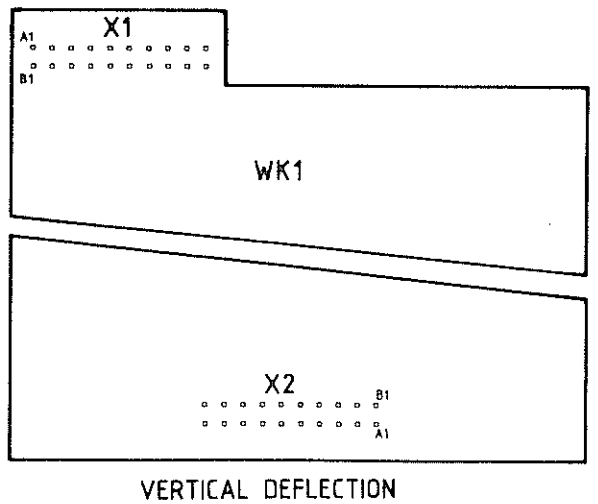
BACK PANEL



HIGH VOLTAGE

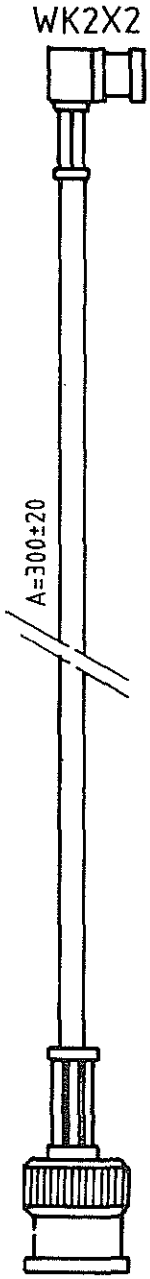


TUBE INTERFACE



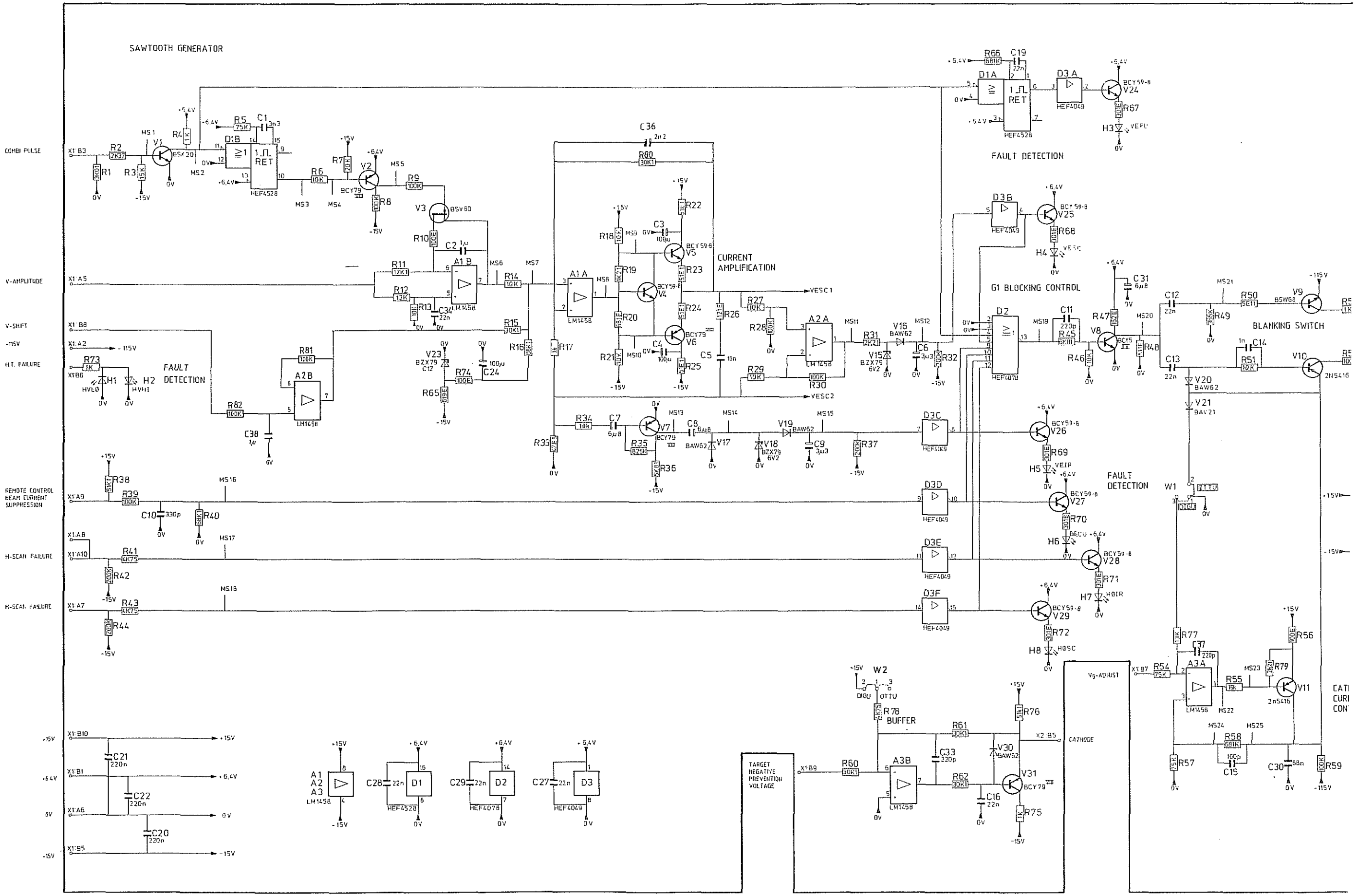
VERTICAL DEFLECTION

WIRING DIAGRAM WK

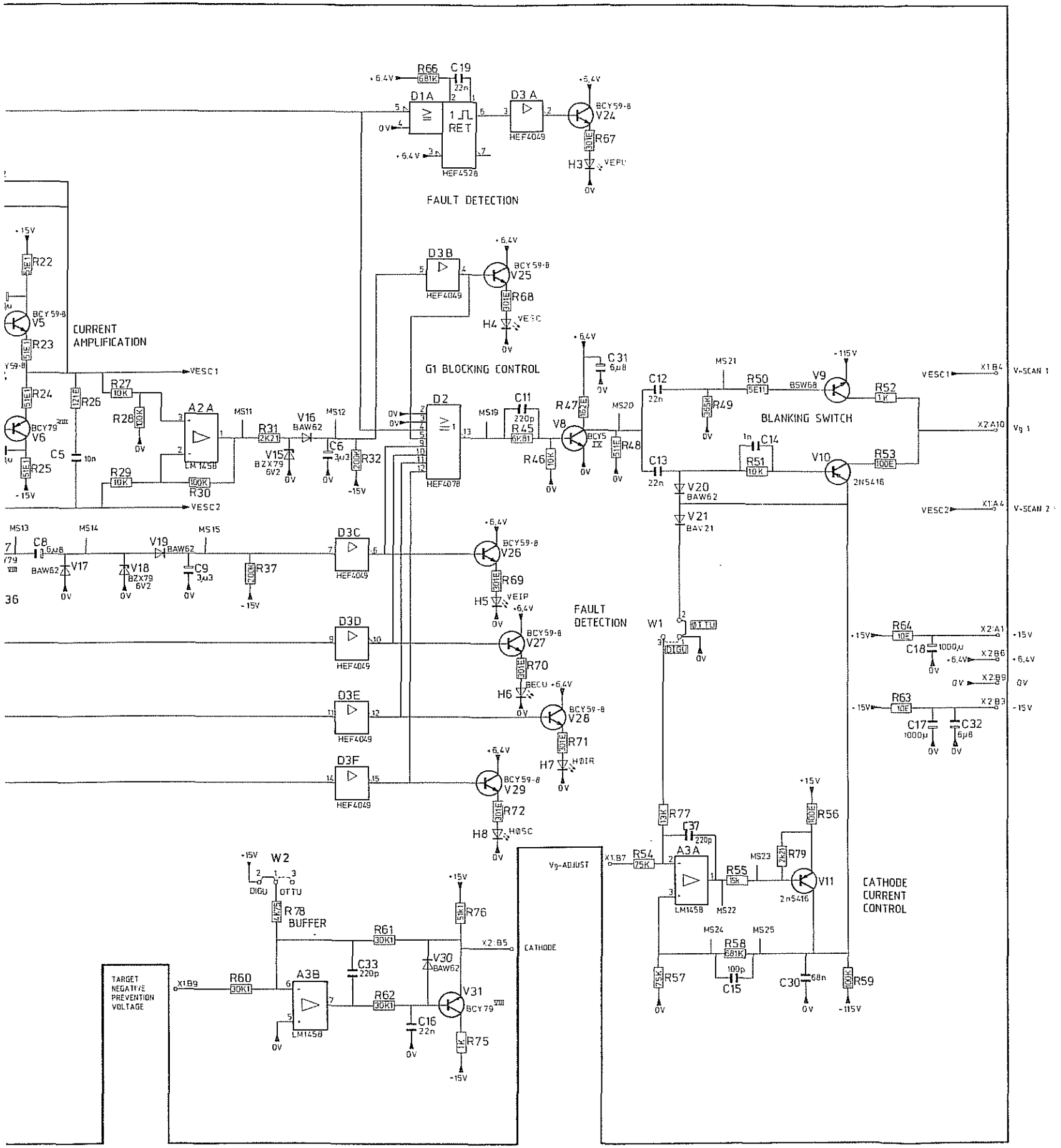


ADAPTATION CABLE WK

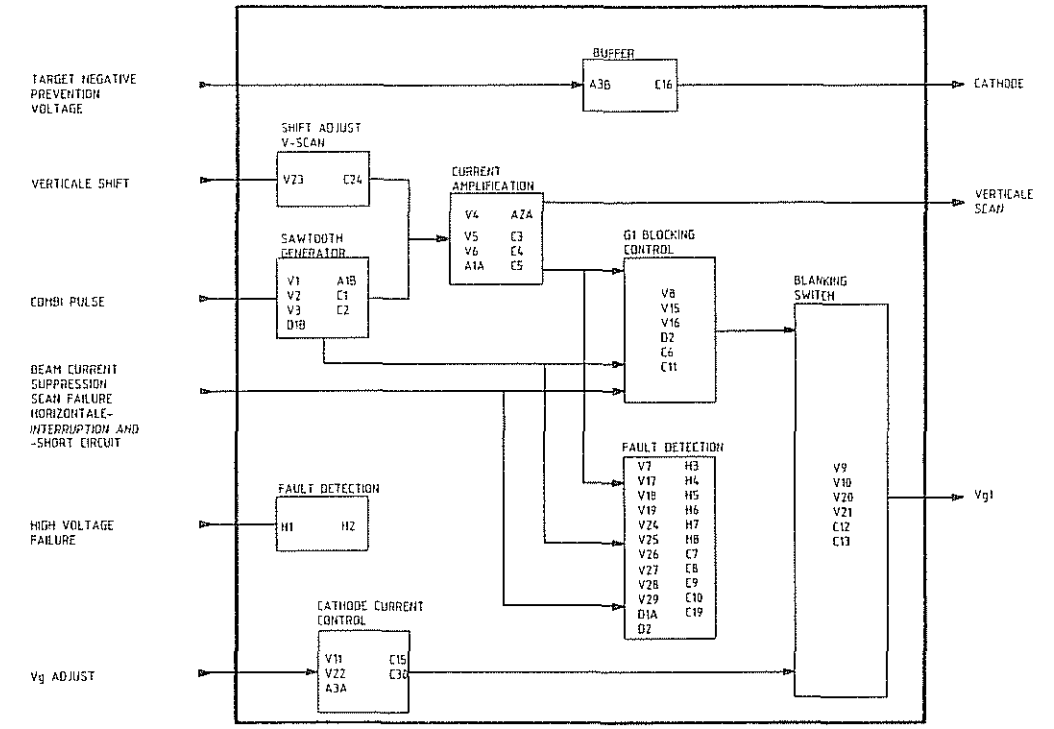
XTV5 Camera



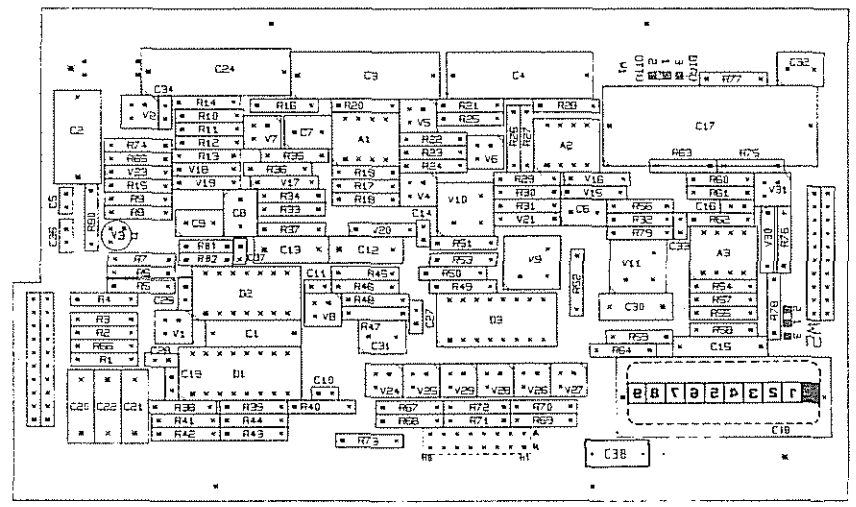
DETAIL 1: CIRCUIT DIAGRAM



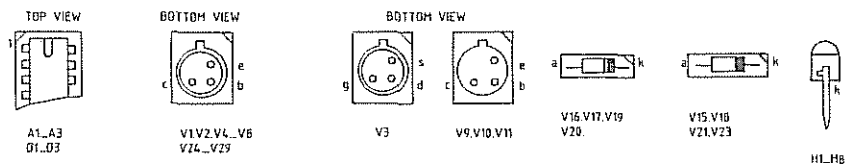
CIRCUIT DIAGRAM



DETAIL 2: TROUBLESHOOTING CHART



DETAIL 3: PRINTED CIRCUIT BOARD LAYOUT

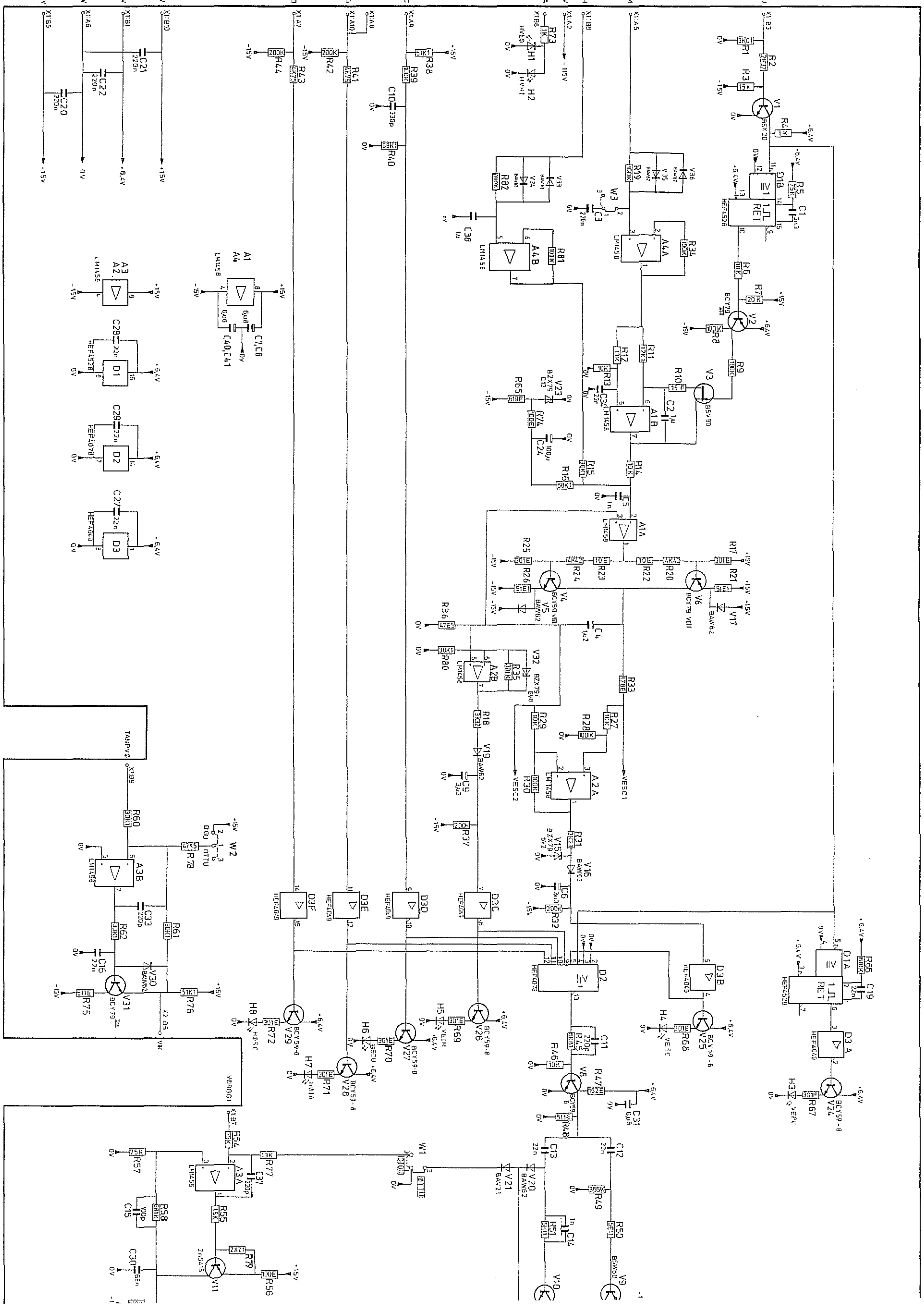


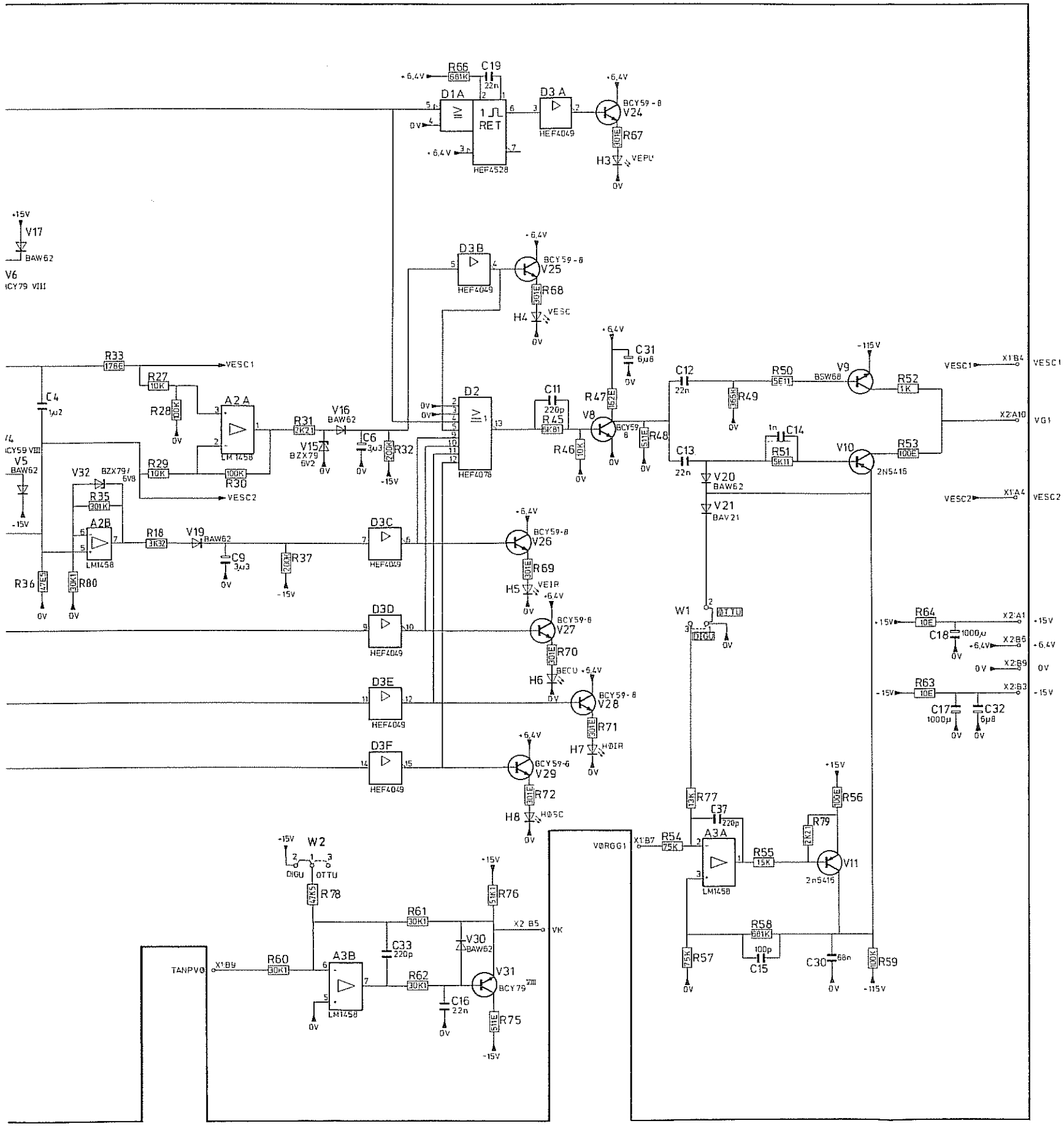
WK1

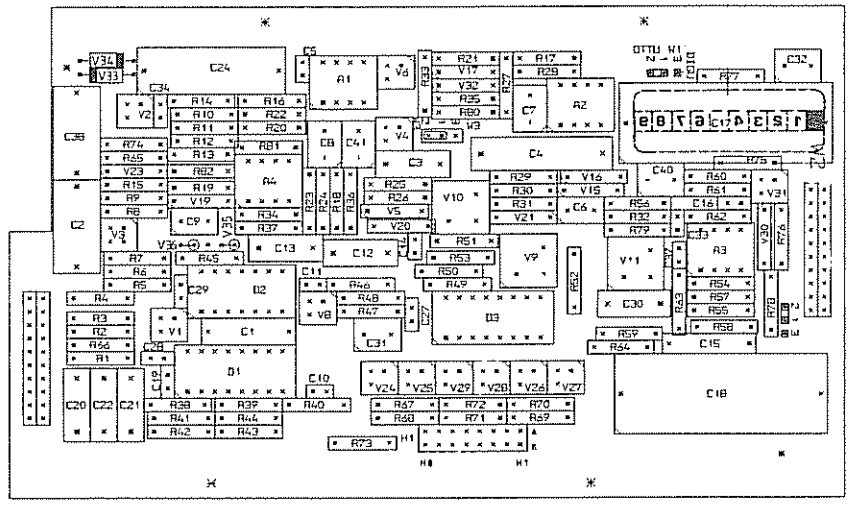
VERTICAL DEFLECTION
4522 107 71314

XTV5 Camera

Section Z







WK1

VERTICAL DEFLECTION	
4522 107 71316	

XTV5 Camera

DETAIL 1 : CIRCUIT DIAGRAM

TARGET POTENTIAL

TARGET CURRENT

FROM TARGET

INPUT AMPLIFIER STAGE

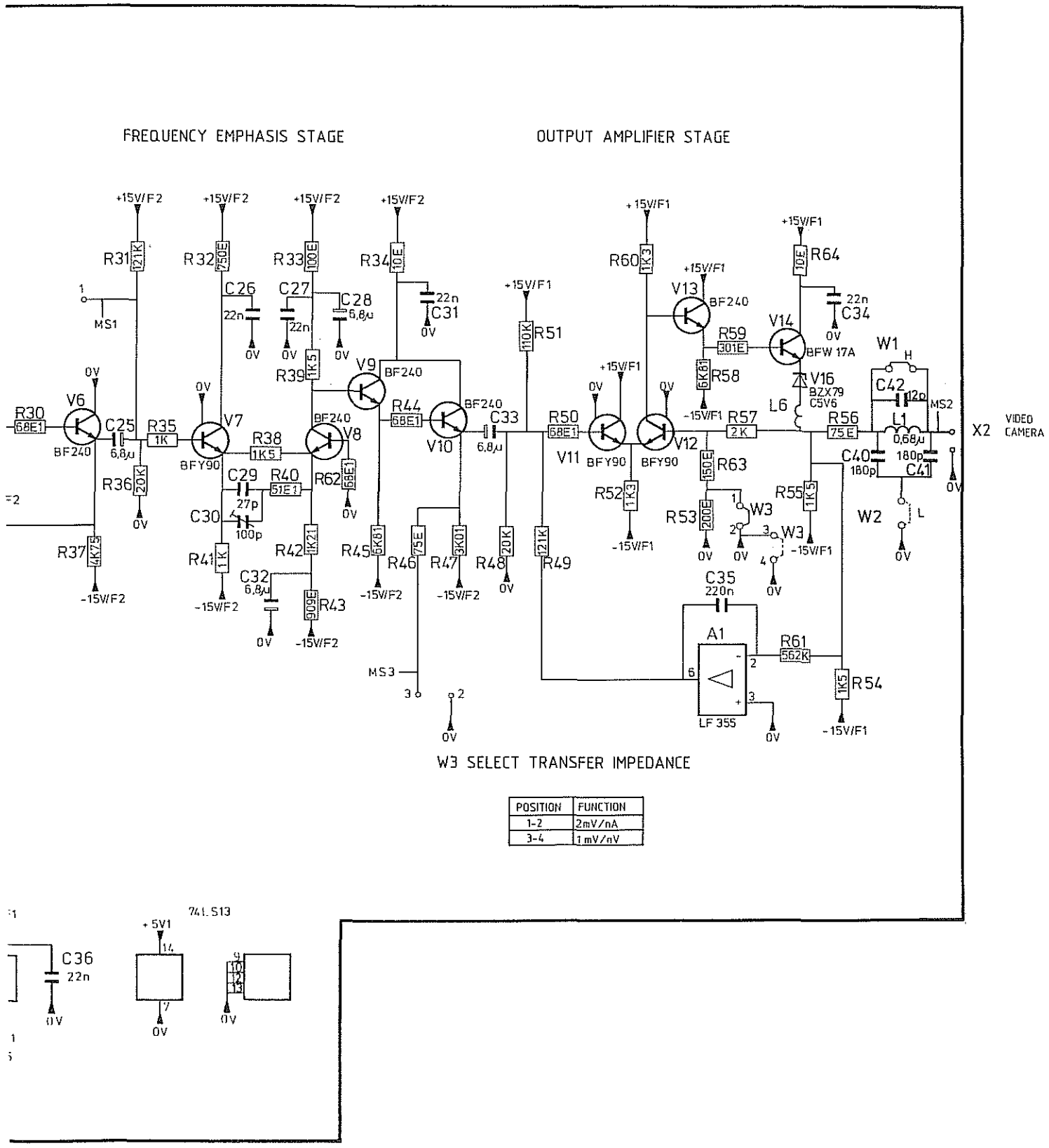
TEST-SIGNAL GENERATOR

FREQUENCY EMPHASIS STAGE

OUTPUT AMPLIFIER STAGE

W3 SELECT TRANSFER IMPEDANCE

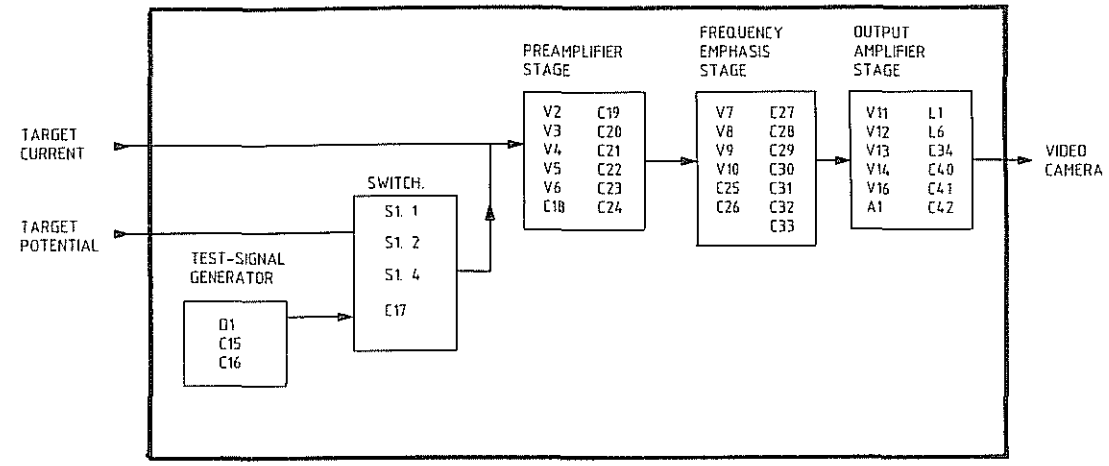
POSITION	FUNCTION
1-2	2mV/nA
3-4	1mV/nV



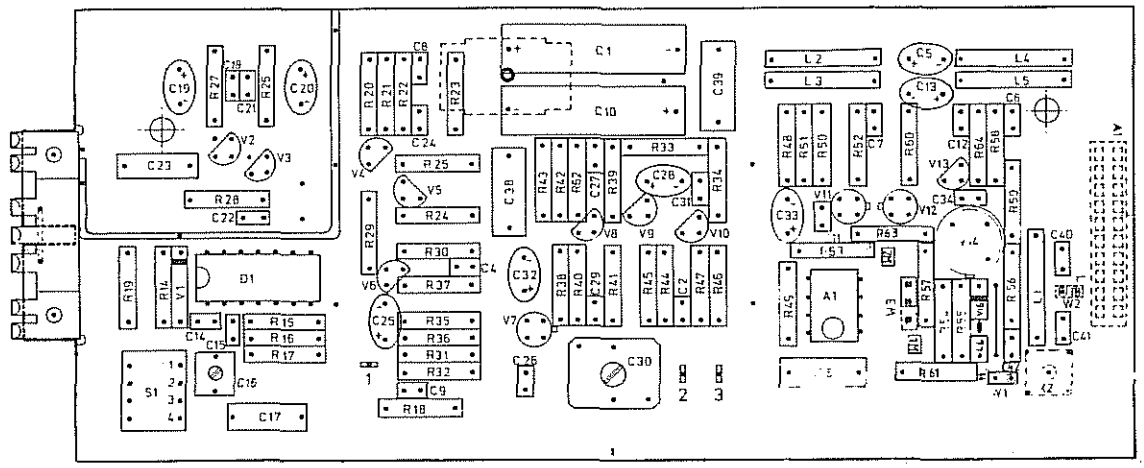
W3 SELECT TRANSFER IMPEDANCE

POSITION	FUNCTION
1-2	2mV/nA
3-4	1mV/nV

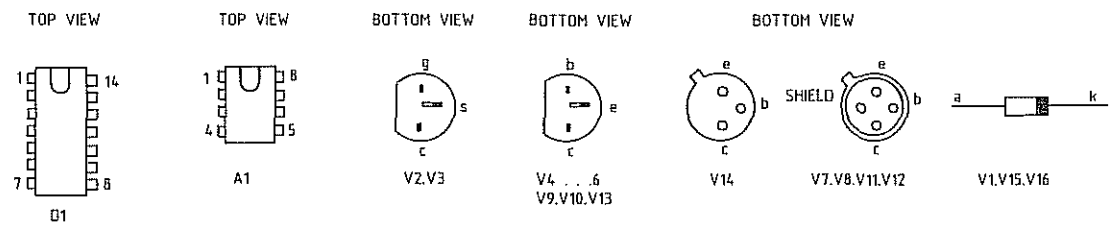
CIRCUIT DIAGRAM



DETAIL 2 : TROUBLESHOOTING CHART



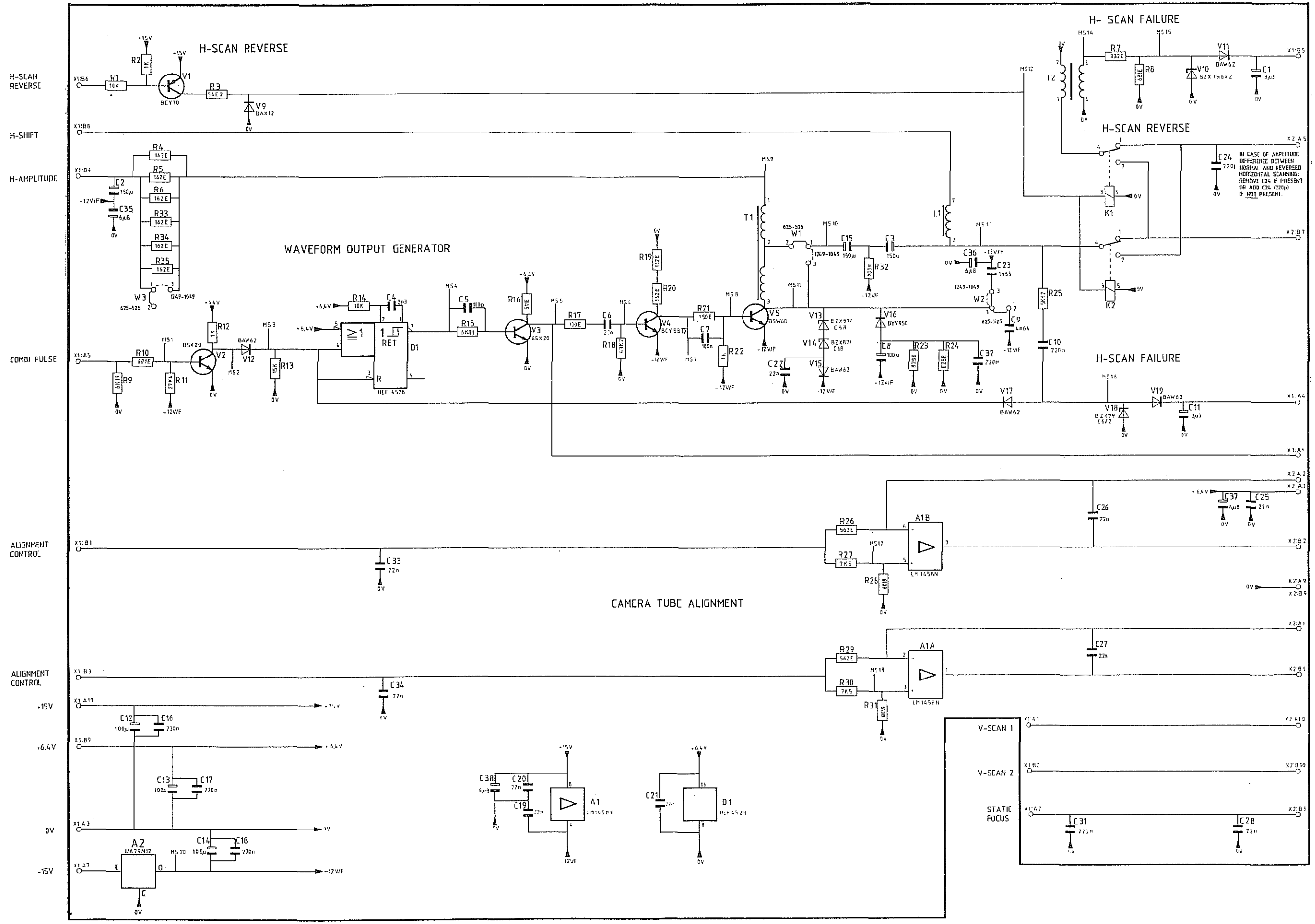
DETAIL 3 : PRINTED CIRCUIT BOARD LAYOUT



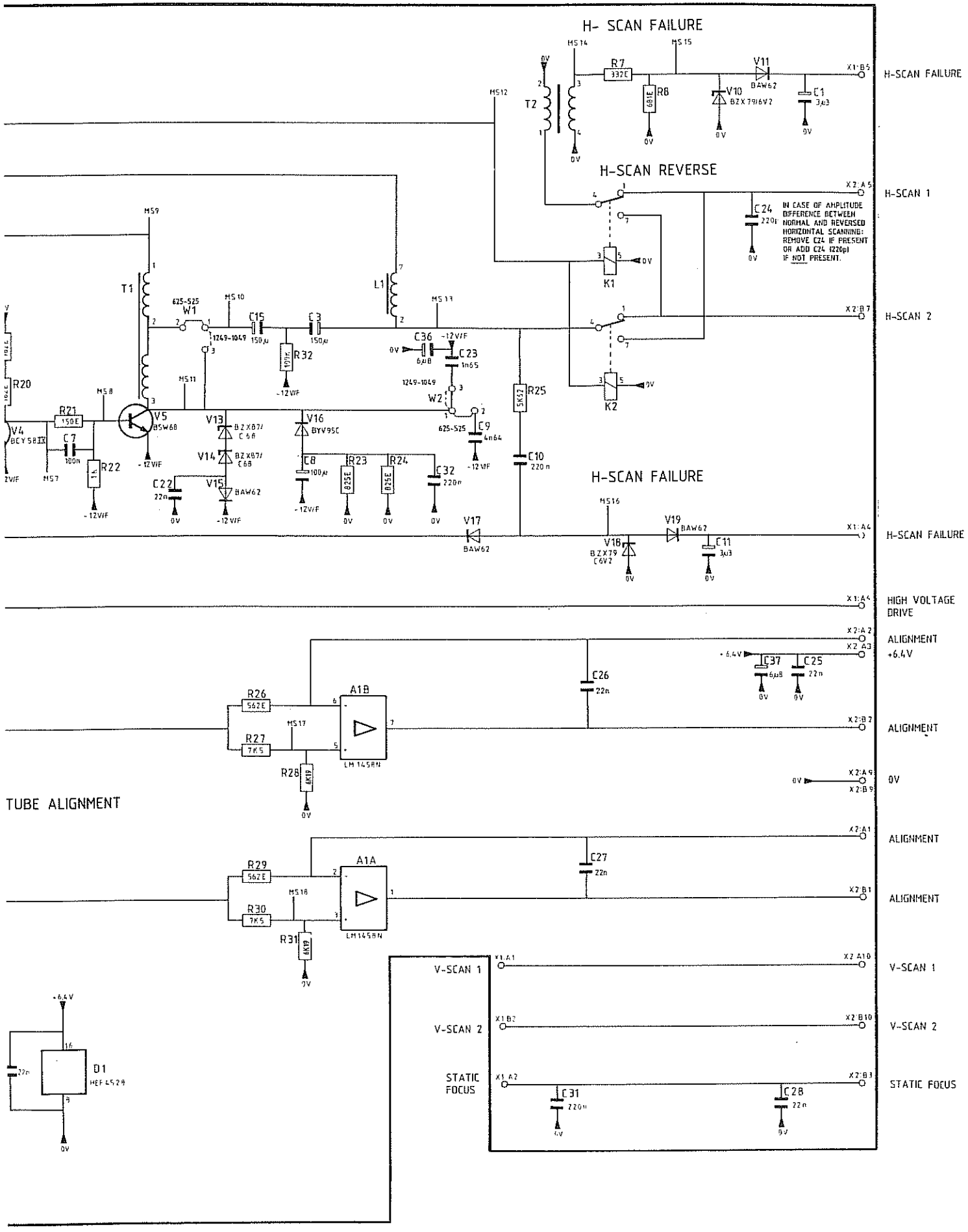
WK2

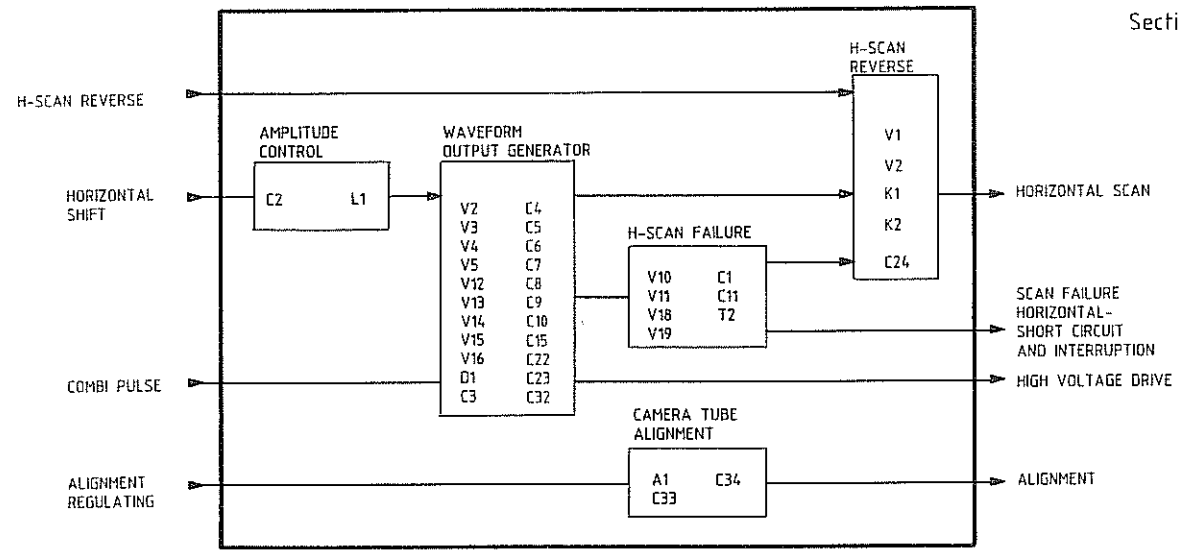
VIDEO PREAMPLIFIER
4522 107 68411

XTV5 Camera

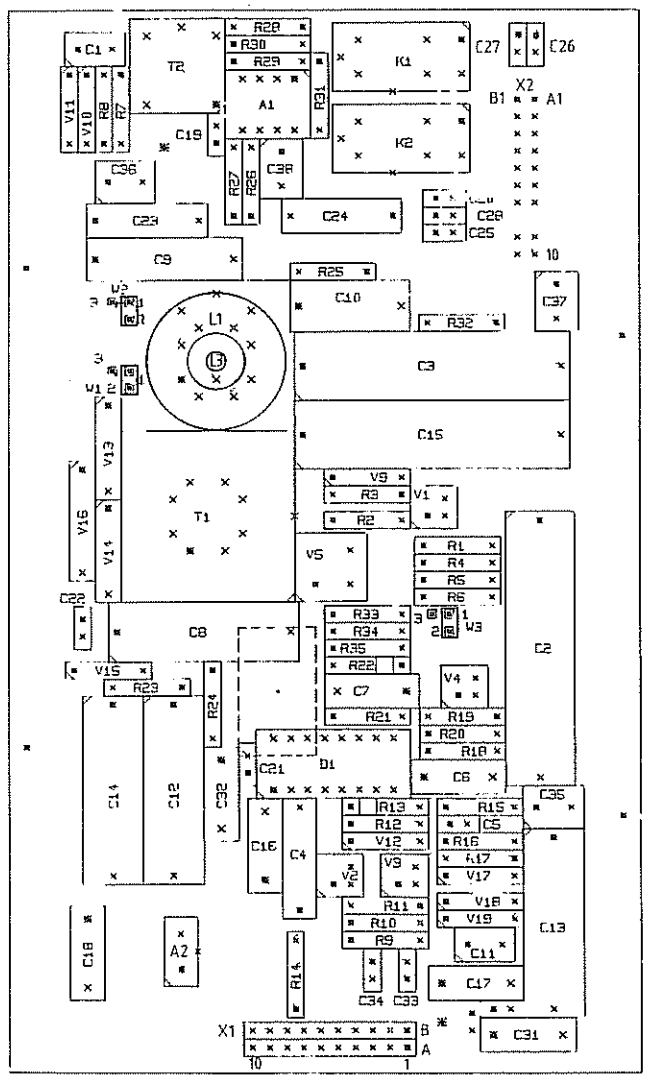


DETAIL 1: CIRCUIT DIAGRAM

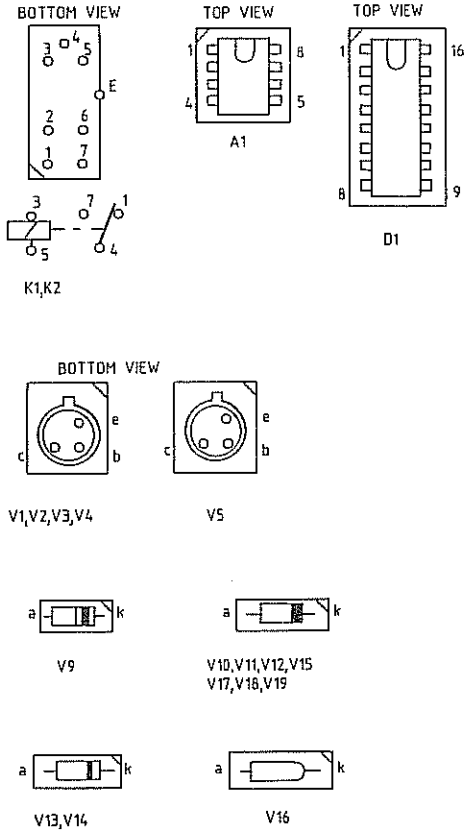




DETAIL 2: TROUBLESHOOTING CHART



DETAIL 3: PRINTED CIRCUIT BOARD LAYOUT

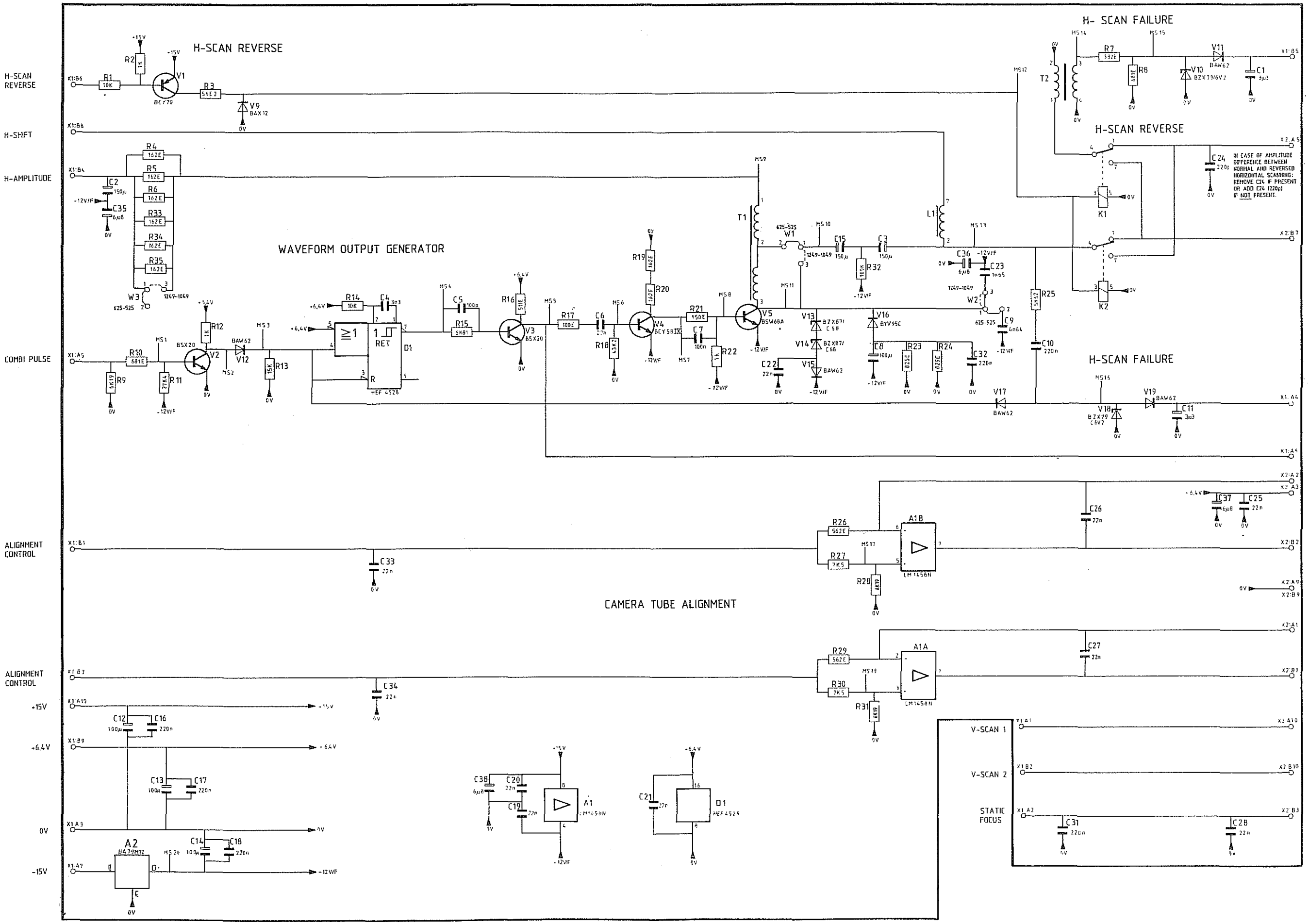


WK3

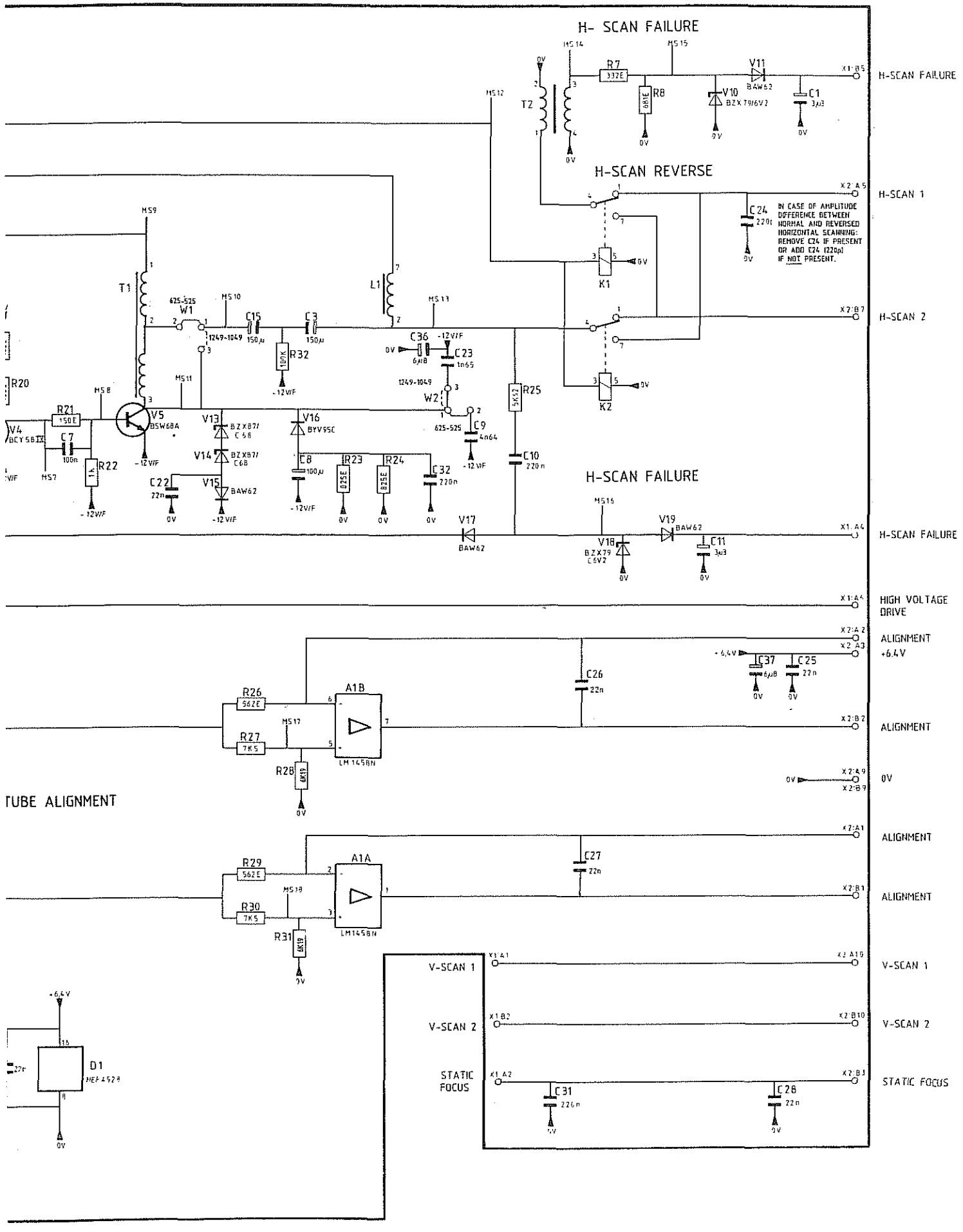
HORIZONTAL DEFLECTION
4522 107 71355

3

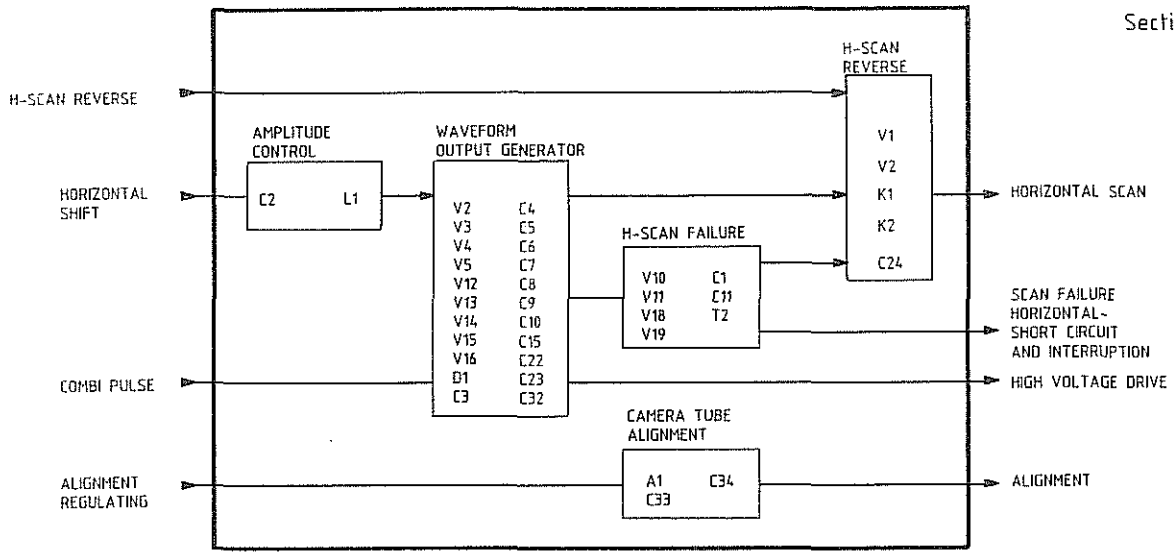
XTV5 Camera



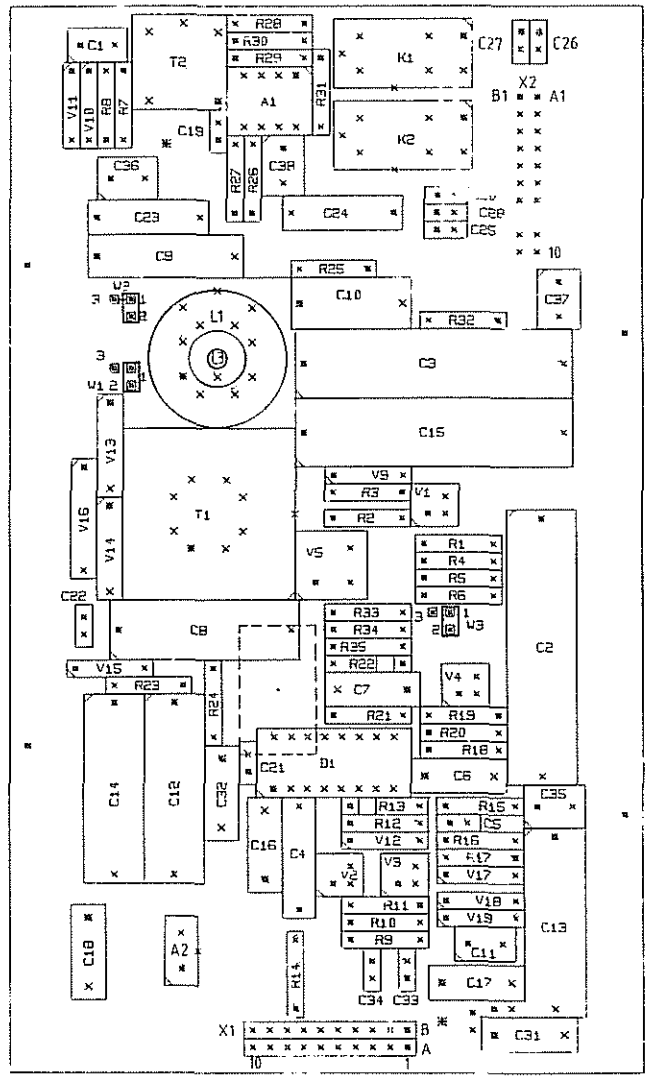
DETAIL 1: CIRCUIT DIAGRAM



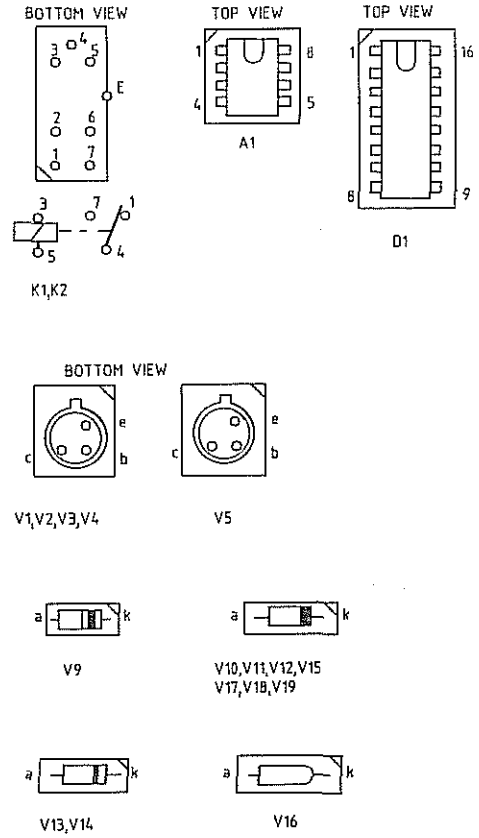
Section Z



DETAIL 2: TROUBLESHOOTING CHART



DETAIL 3: PRINTED CIRCUIT BOARD LAYOUT



WK3

HORIZONTAL DEFLECTION
4522 107 71356

3

H-SCAN FAILURE

H-SCAN REVERSE

H-SCAN FAILURE

CAMERA TUBE ALIGNMENT

WAVEFORM OUTPUT GENERATOR

H-SCAN REVERSE

H-SHIFT

H-AMPLITUDE

COMBI PULSE

ALIGNMENT CONTROL

ALIGNMENT CONTROL

+15V

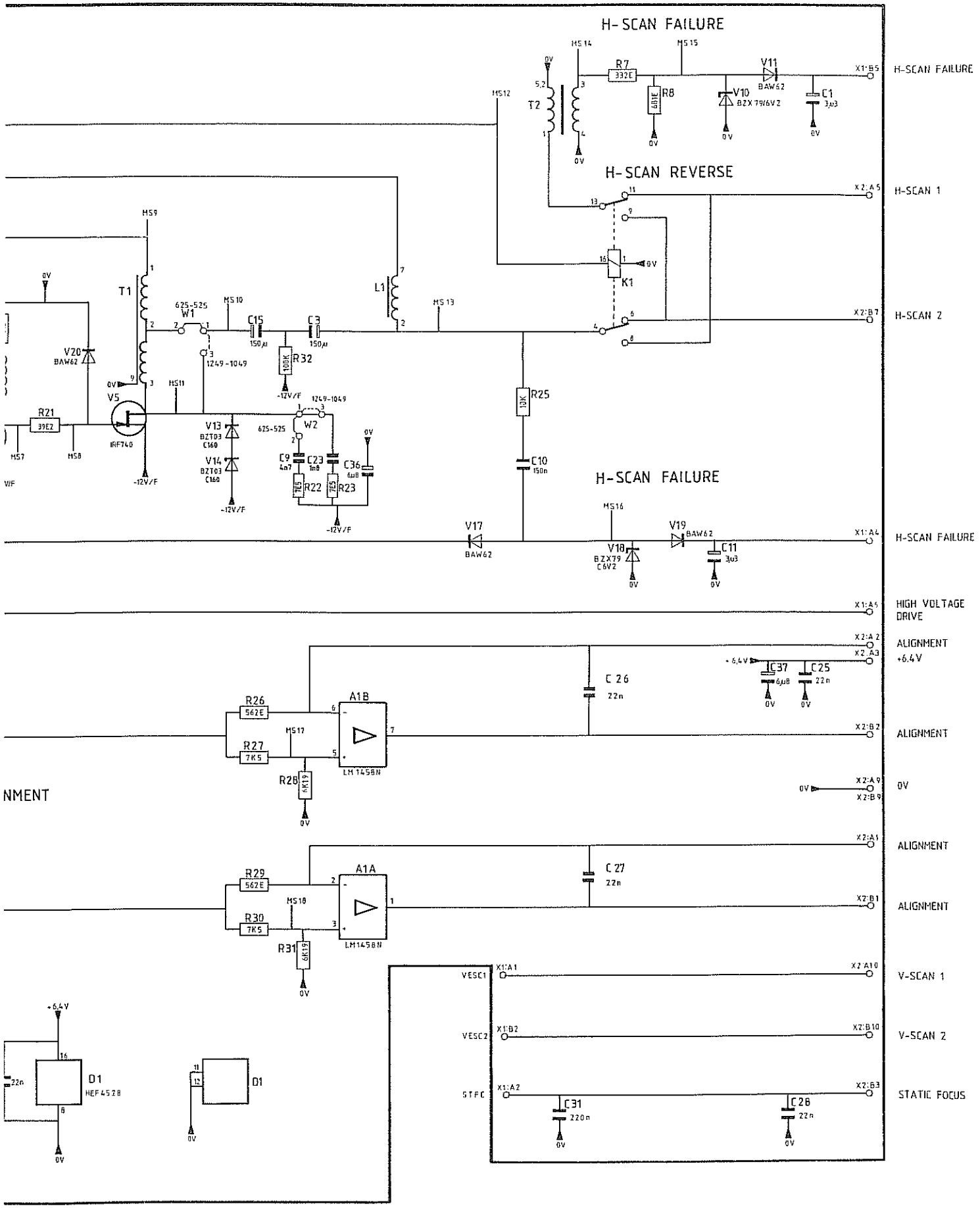
+6.4V

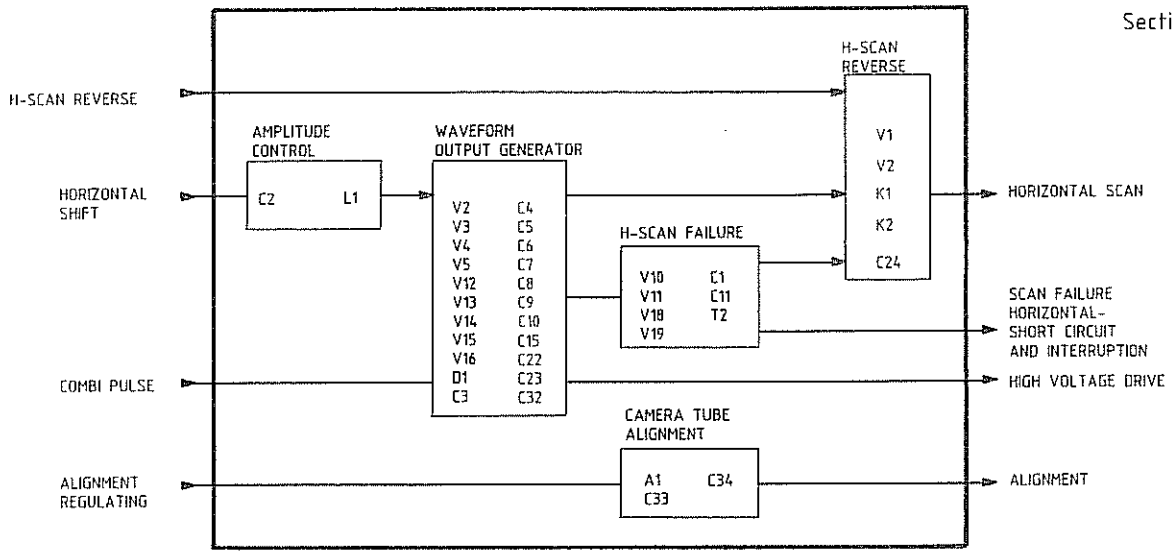
0V

-15V

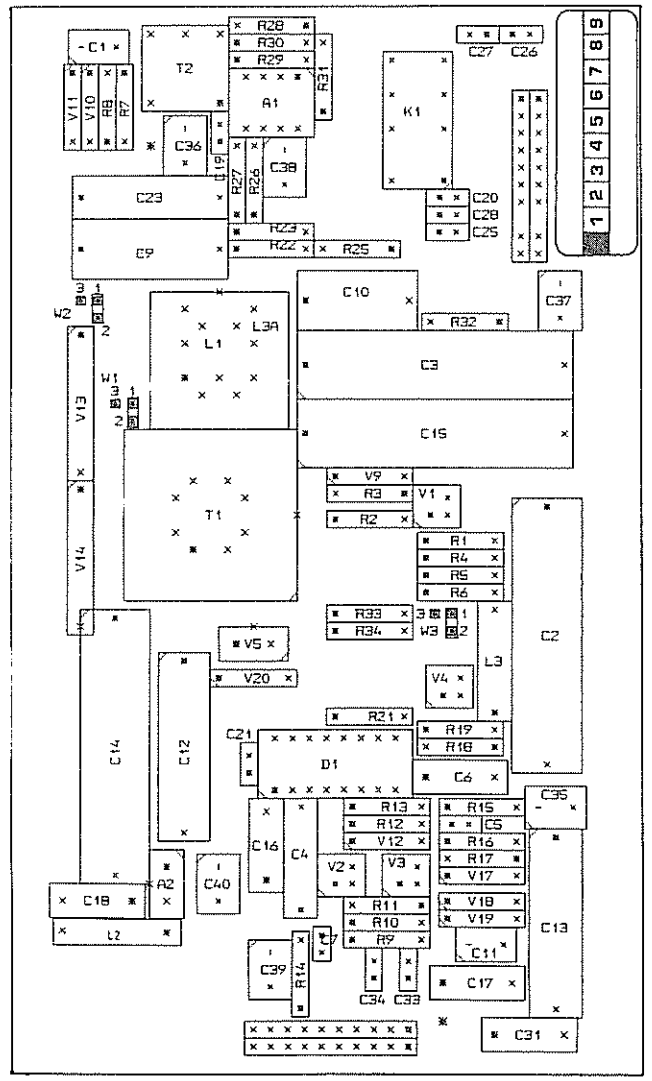
XTV5 Camera

DETAIL 1: CIRCUIT DIAGRAM

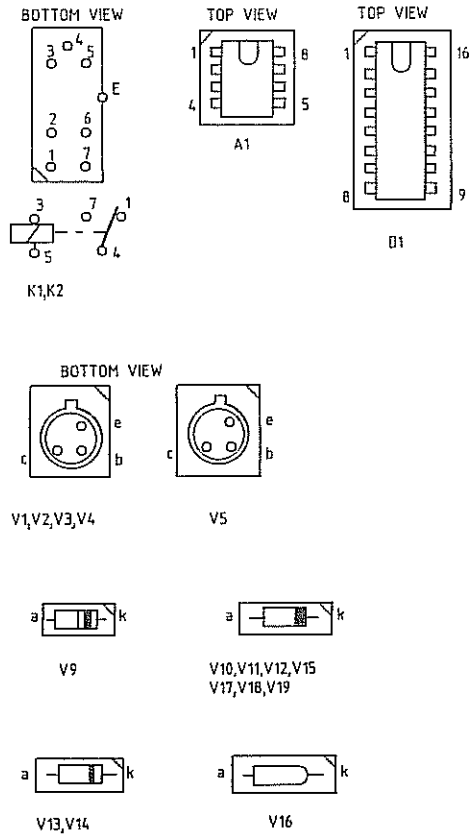




DETAIL 2: TROUBLESHOOTING CHART



DETAIL 3: PRINTED CIRCUIT BOARD LAYOUT

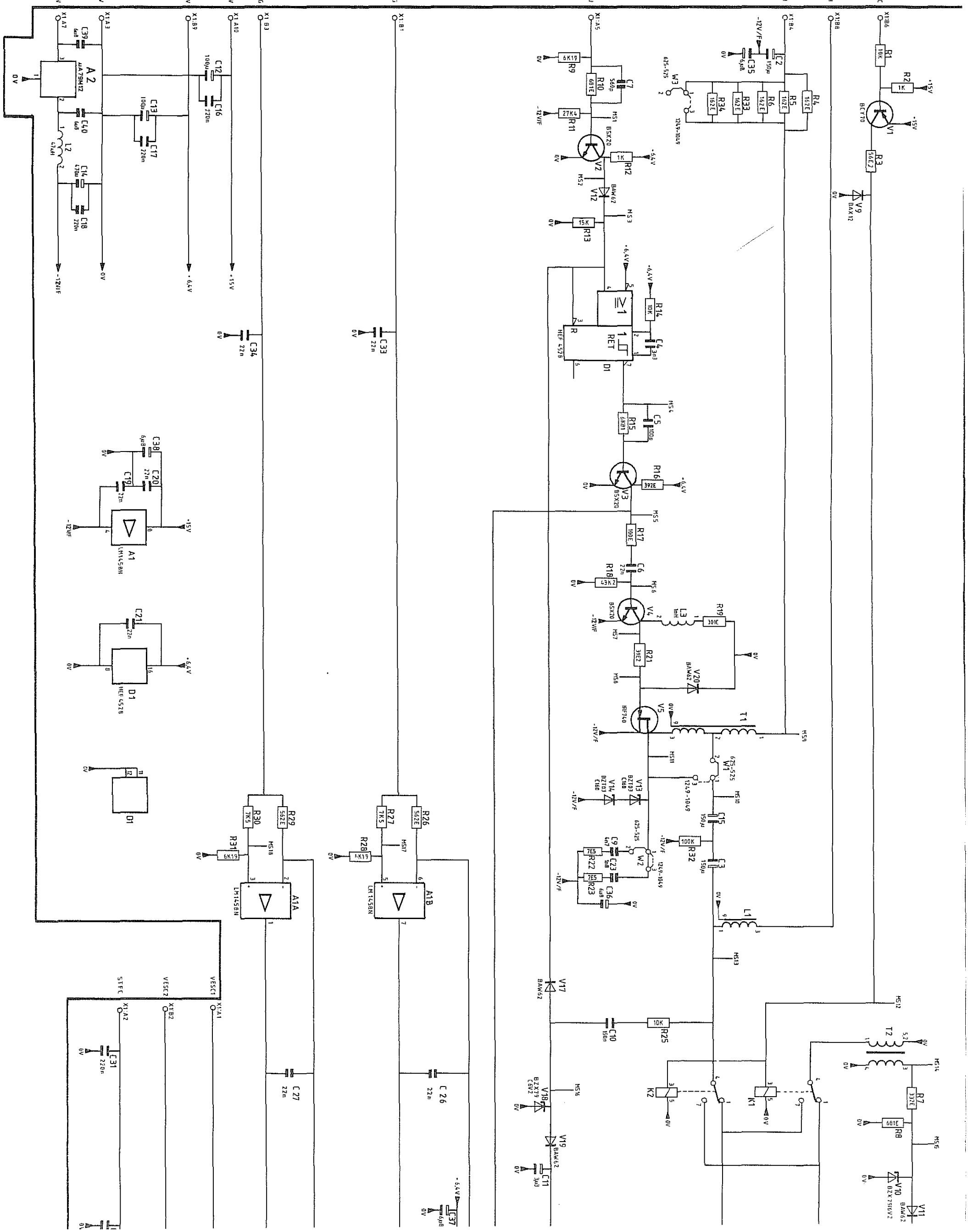


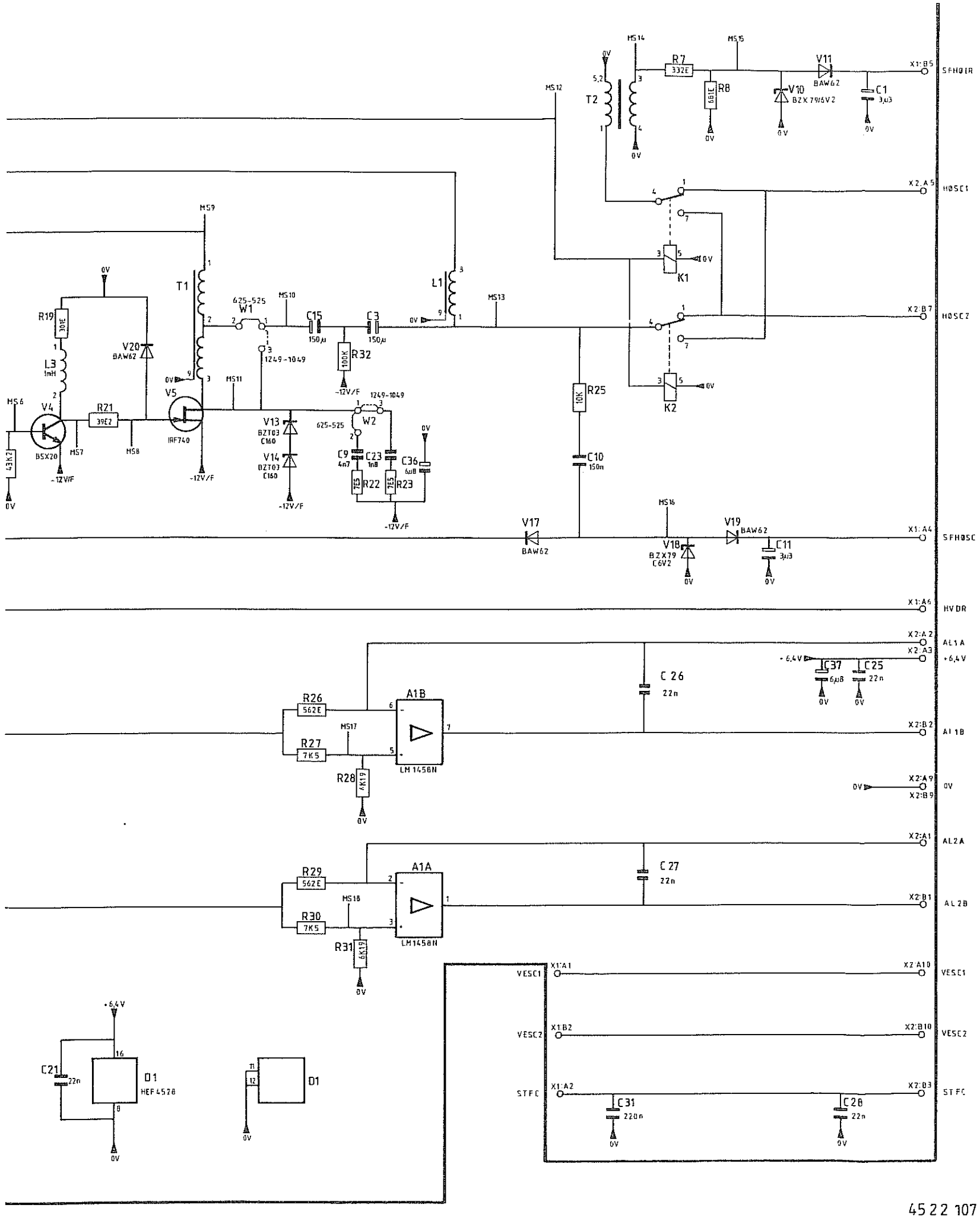
WK3

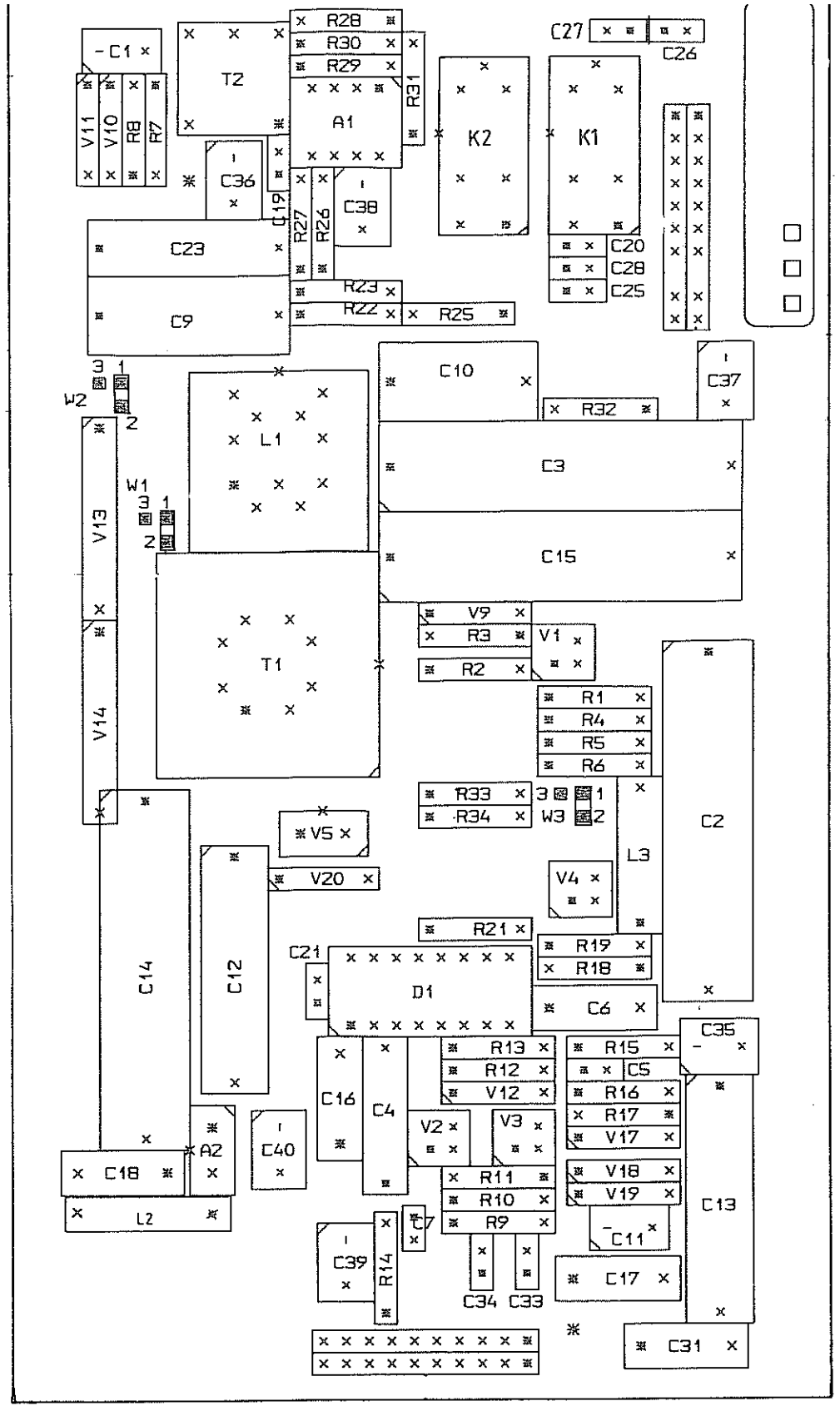
HORIZONTAL DEFLECTION
4522 107 71357

3

XTV5 Camera

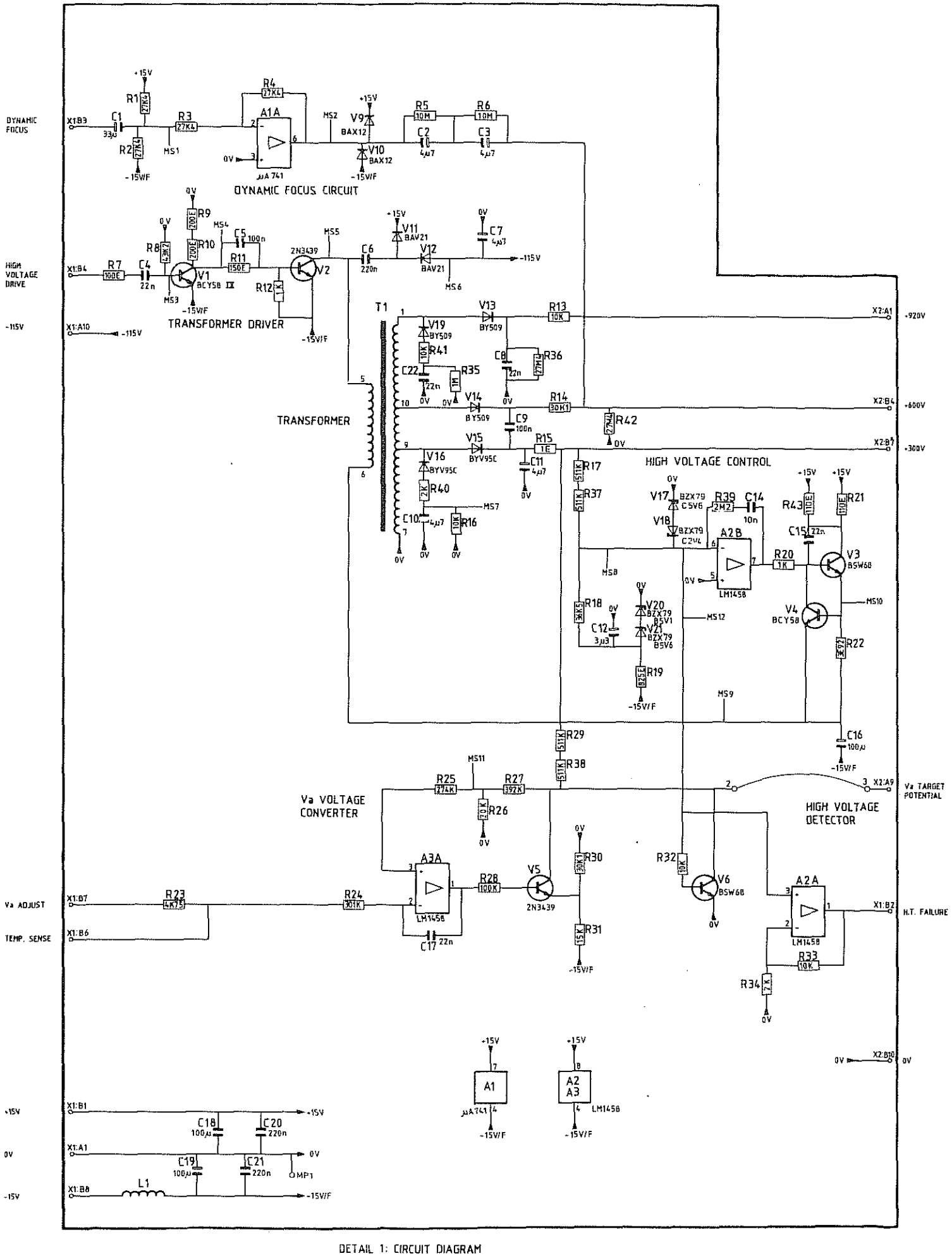

SRHOVSLC
HBSH
HBAM
CBPU
AL01RG
AL07RG
-15V
+15V
+6,4V
0V
-12V/F
-12V/IF
X1:B6
X1:BB
X1:B4
X1:A5
X1:B1
X1:B3
X1:A10
X1:B9
X1:A3
X1:A7
R1 10K
R2 1K
R3 56E2
R4 162E
R5 162E
R6 162E
R33 162E
R34 162E
C35 6µ8
C2 150µ
W3 625-525
12x9-10x9
V1 BCY70
V9 BAX12
C7 560p
R9 6K19
R10 681E
R11 27K4
V2 BSX20
R12 1K
V12 BAW62
R13 15K
R14 10K
C4 3n3
D1 HEF4528
C5 100p
R15 6K81
R16 392E
V3 BSX20
R17 100E
C6 22n
R18 47K
V4 BSX20
L3 1mH
R19 30E
R21 39E2
V20 BAW62
V5 IRF740
T1
W1 625-525
12x9-10x9
V13 BZT03C16
V14 BZT03C16
C15 150µ
R32 100K
C3 150µ
L1
W2 625-525
12x9-10x9
C9 4n7
C23 1n8
R22 7E5
R23 7E5
C36 6µ8
V17 BAW62
C10 150n
R25 10K
V18 BZX79C6V2
V19 BAW62
C11 3n3
K2
K1
T2
R7 332E
R8 681E
V10 BZX79C6V2
V11 BAW62
C39 6µ8
A2 µA79M12
C40 6µ8
L2 47µH
C14 470µ
C18 220n
C12 100µ
C16 220n
C13 100µ
C17 220n
C34 22n
C33 22n
C38 6µ8
C19 22n
C20 22n
A1 LM145BH
C21 22n
D1 HEF4528
R26 562E
R27 7K5
R28 6K19
A1B LM145BN
R29 562E
R30 7K5
R31 6K19
A1A LM145BN
C37 6µ8
C26 22n
C27 22n
C31 220n
VESC1
VESC2
STFC
X1:A1
X1:B2
X1:A2



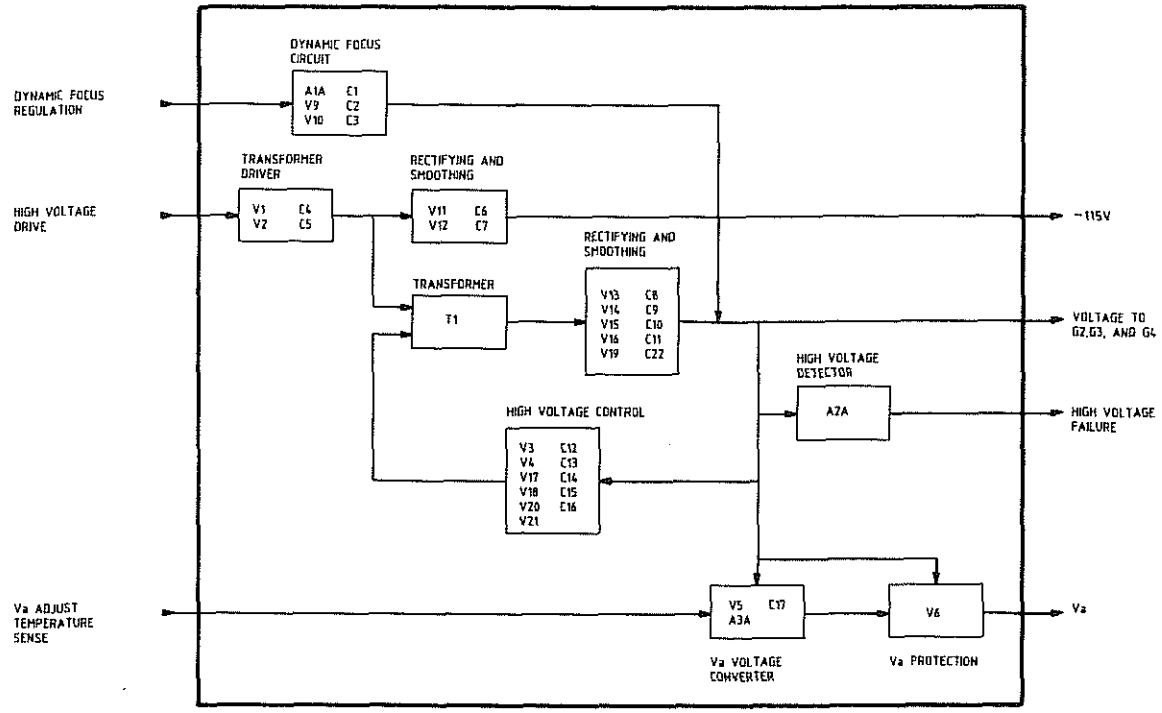


HORIZONTAL DEFLECTION
4522 107 71358

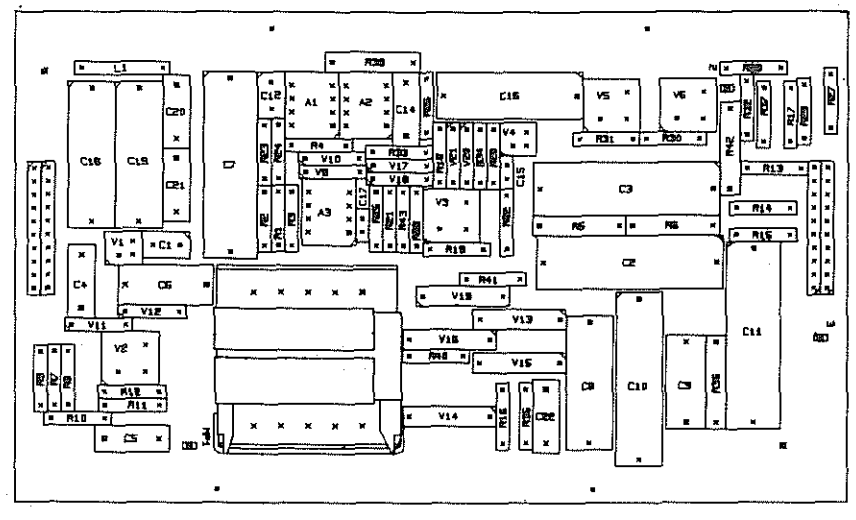
XTV5 Camera



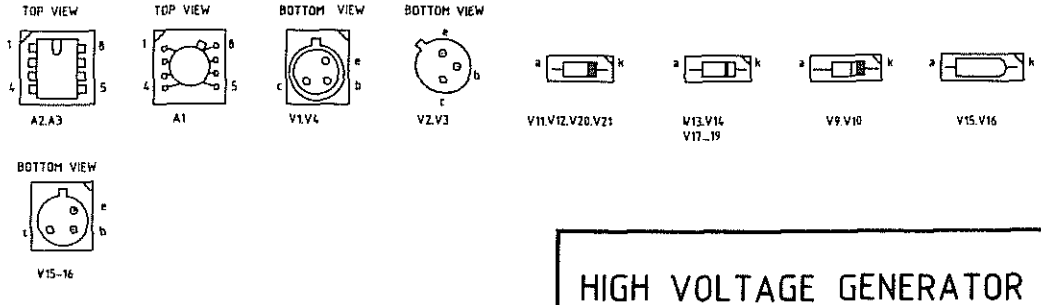
DETAIL 1: CIRCUIT DIAGRAM



DETAIL 2: TROUBLESHOOTING CHART



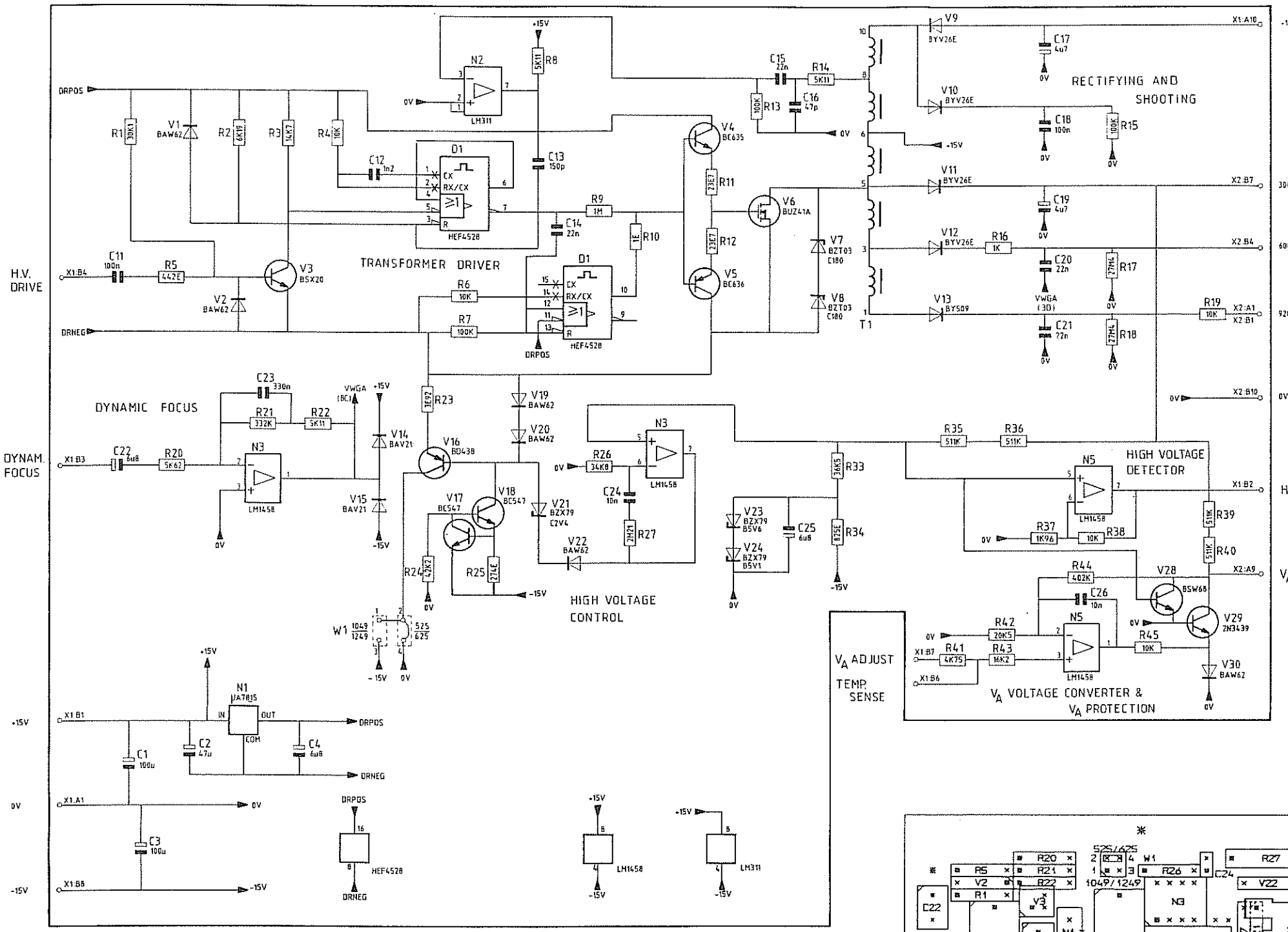
DETAIL 3: PRINTED CIRCUIT BOARD LAYOUT



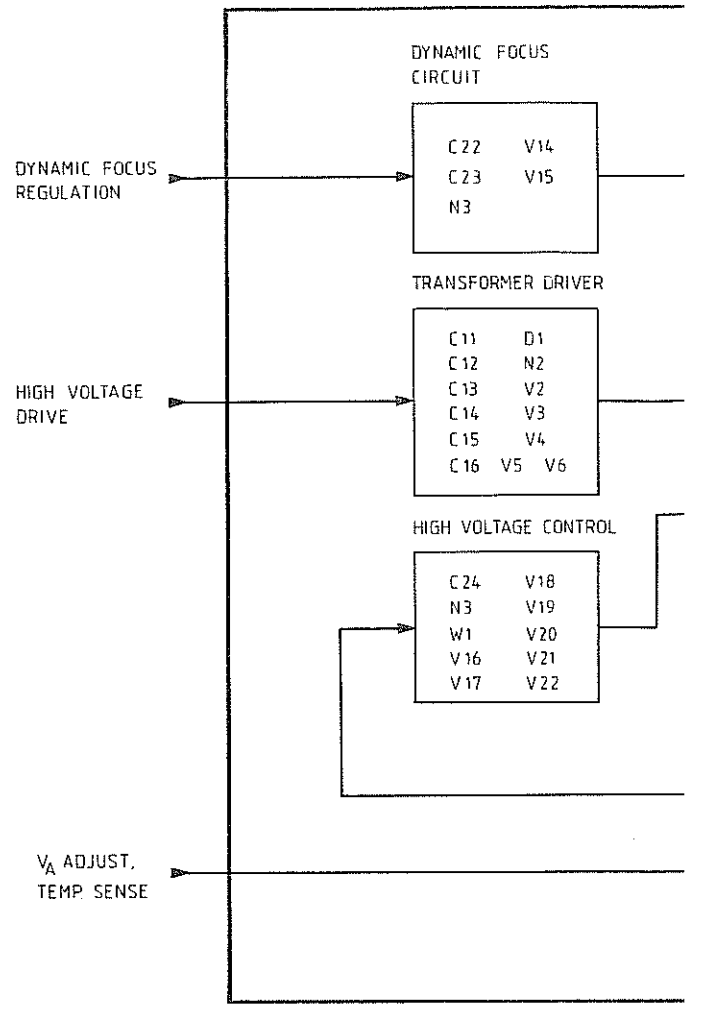
WK4

HIGH VOLTAGE GENERATOR 4522 107 71411	

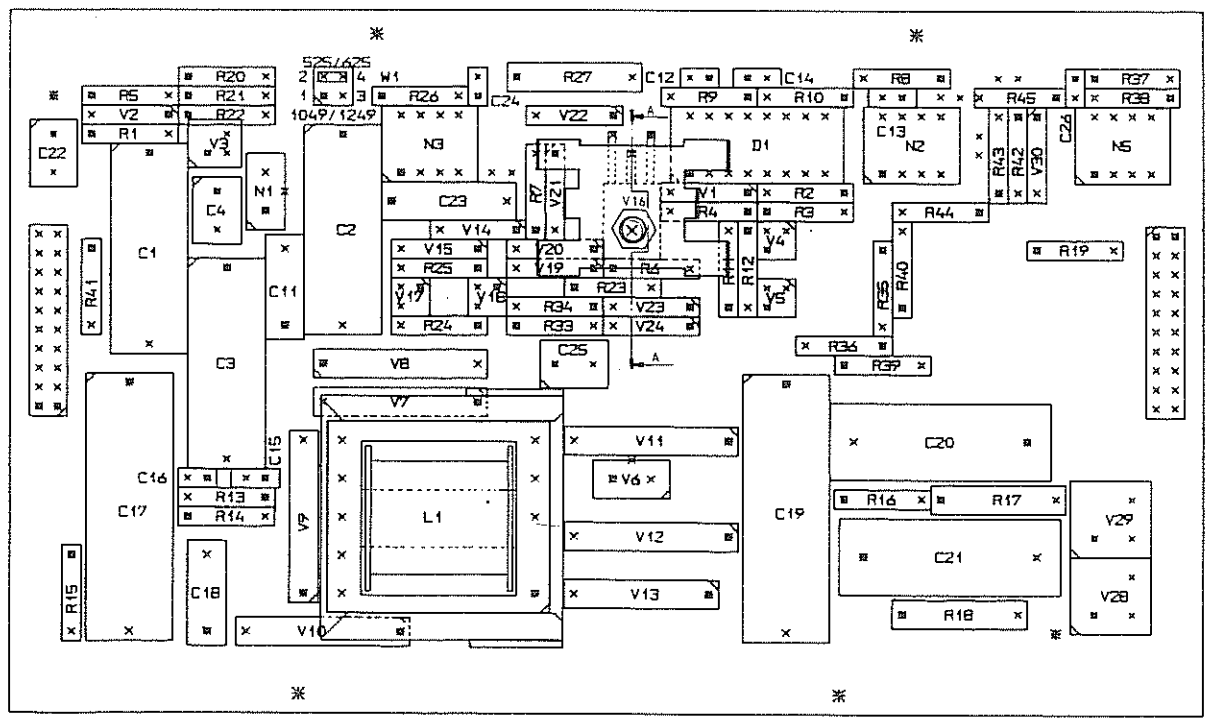
XTV 5 CAMERA



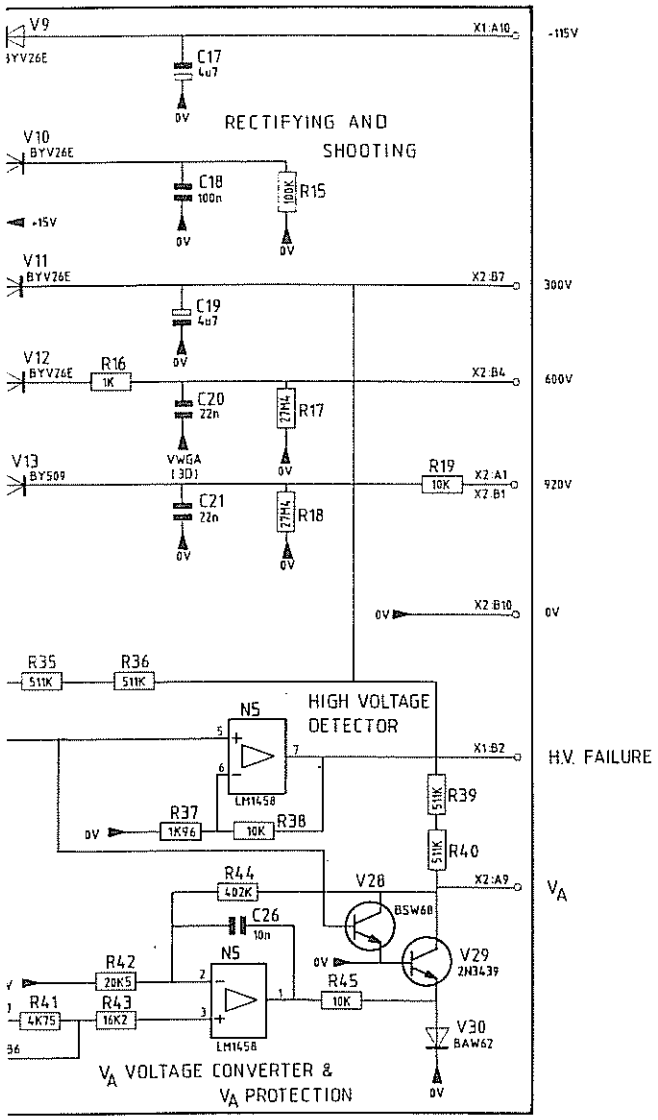
DETAIL 1 : CIRCUIT DIAGRAM

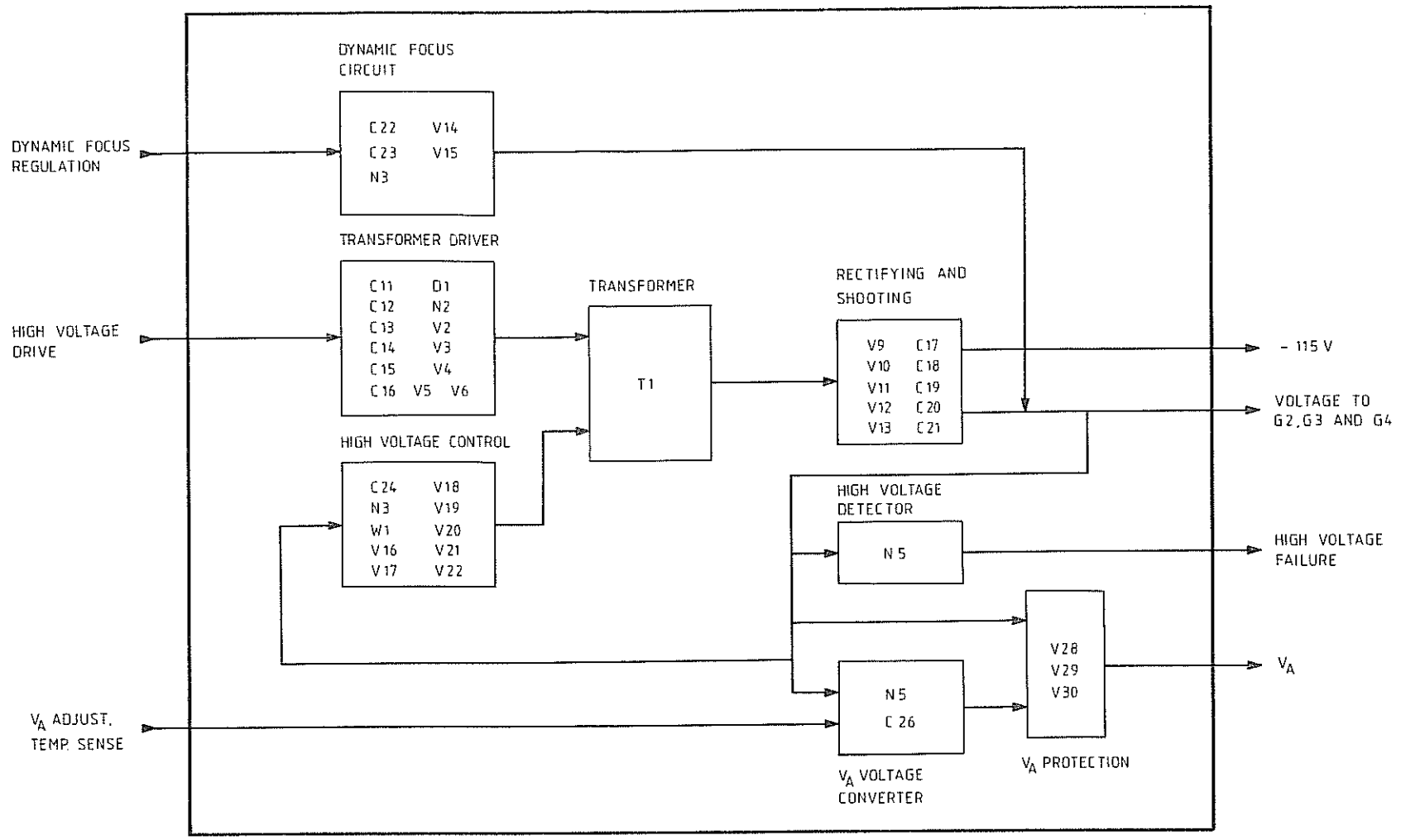


DETAIL 2

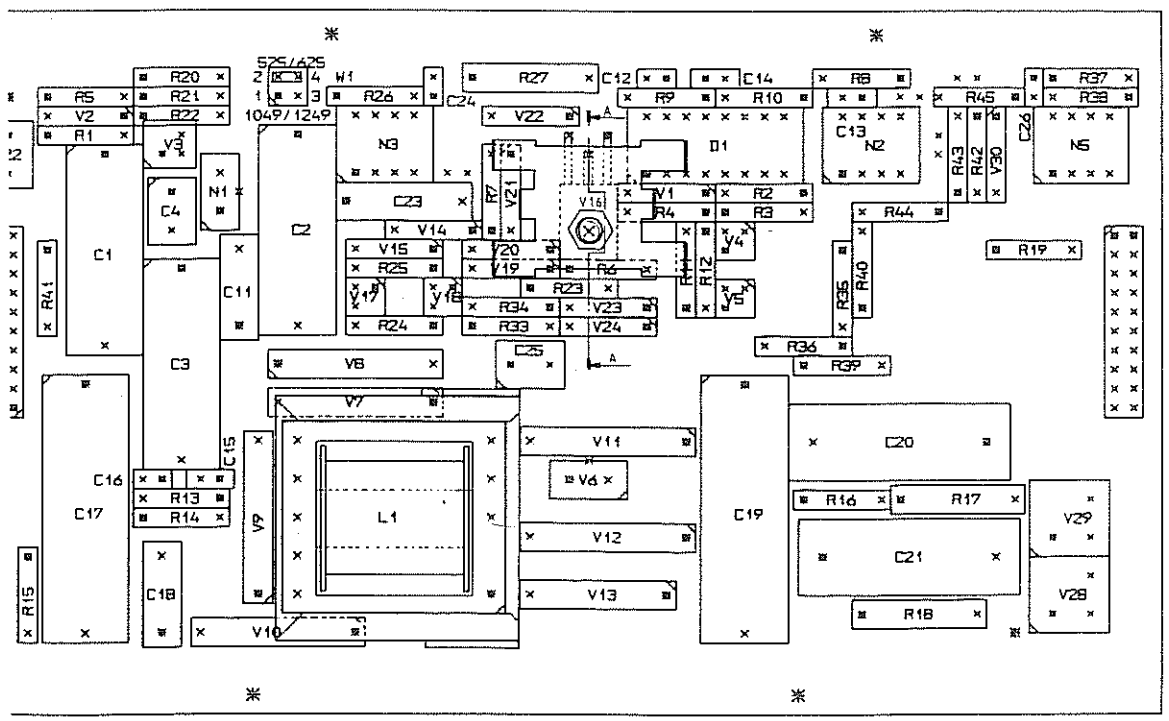


DETAIL 3: PRINTED CIRCUIT BOARD LAYOUT





DETAIL 2 : TROUBLESHOOTING CHART

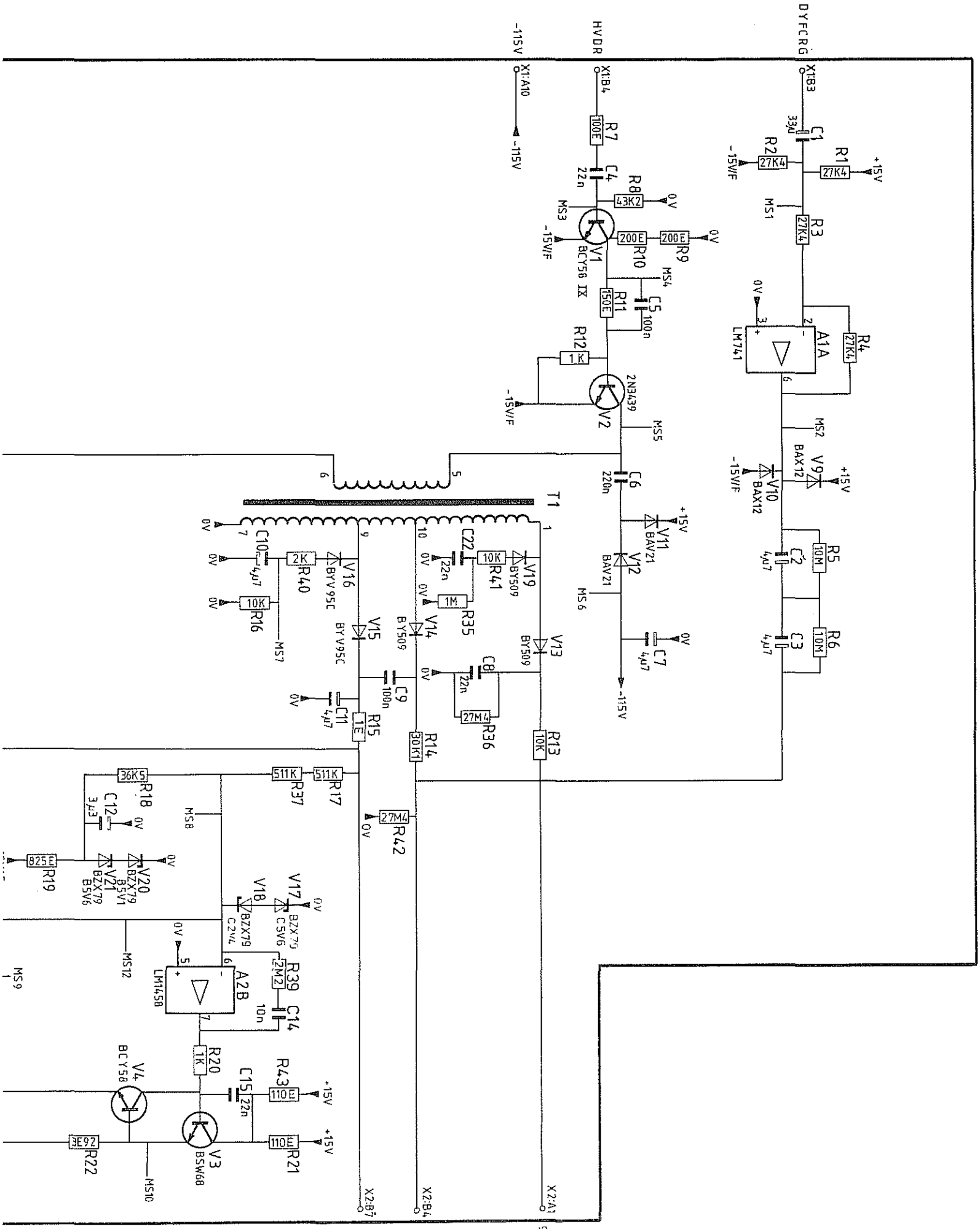


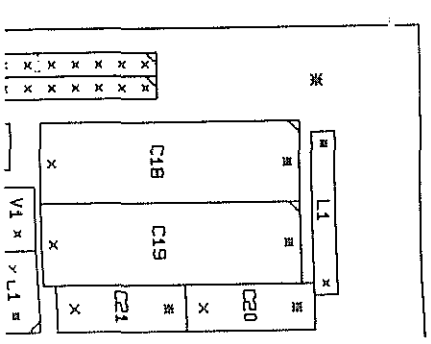
DETAIL 3: PRINTED CIRCUIT BOARD LAYOUT

WK4

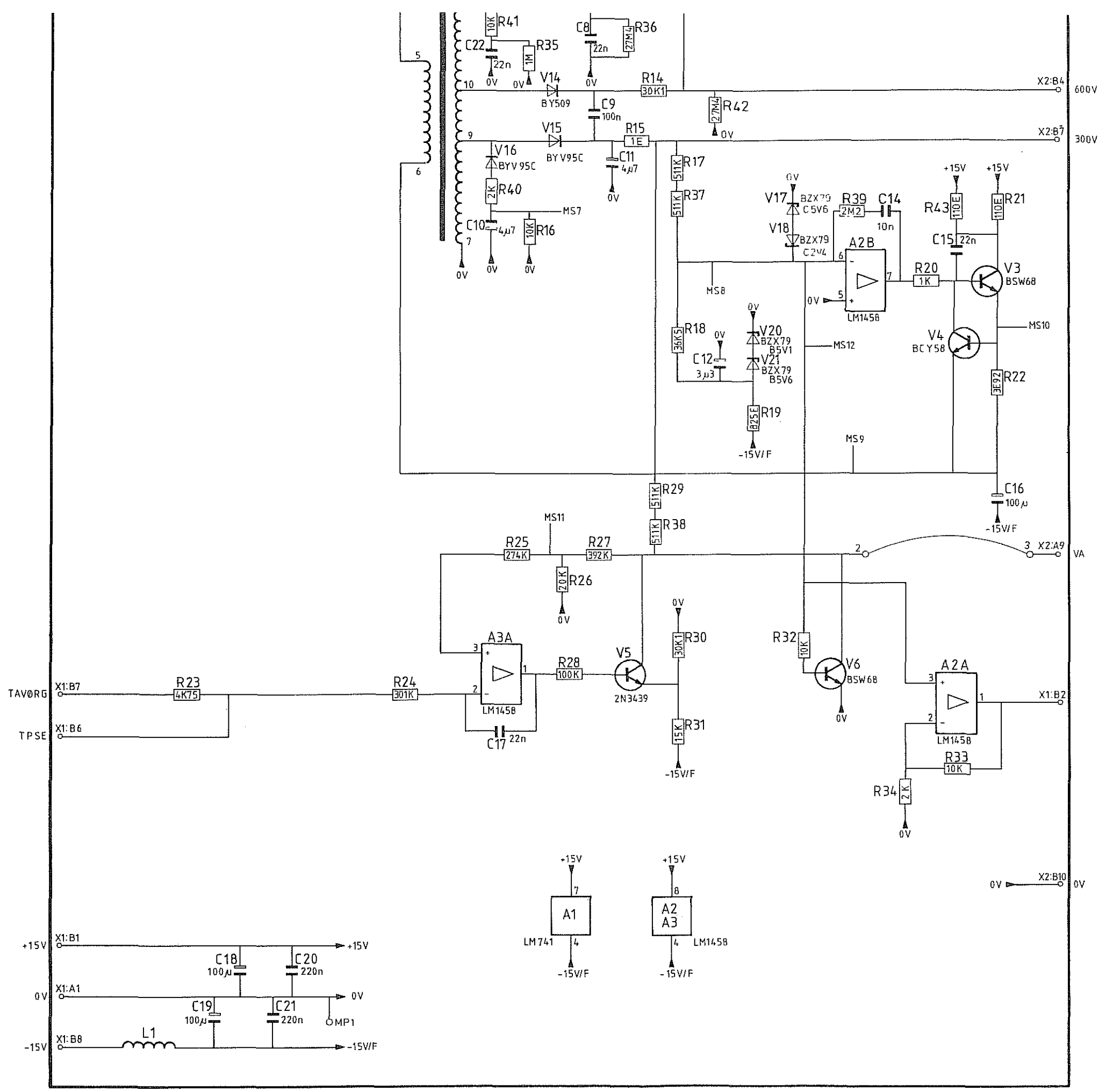
HIGH VOLTAGE GENERATOR
4522 108 07751

Section Z


DYFCRG
X1:B3
33µ
C1
R2
27K4
-15V/F
R1
27K4
+15V
MS1
R3
27K4
0V
3
2
A1A
LM741
6
R4
27K4
MS2
V9
BAX12
+15V
V10
BAX12
-15V/F
C2
4,µ7
R5
10M
C3
4,µ7
R6
10M
0V
C7
4,µ7
-115V
HVDR
X1:B4
R7
100E
C4
22n
R8
43K2
0V
MS3
-15V/F
V1
BCY58 IX
200E
R10
200E
R9
0V
MS4
R11
150E
C5
100n
R12
1K
-15V/F
2N3439
V2
MS5
C6
220n
+15V
V11
BAV21
V12
BAV21
MS6
-115V
-115V
X1:A10
T1
6
5
7
9
10
1
0V
C10
4,µ7
2K
R40
BYV 95C
V16
10K
R16
MS7
V15
BY V95C
C22
22n
10K
R41
V19
BY509
0V
1M
R35
V14
BY509
V13
BY509
C8
22n
27M4
R36
0V
C9
100n
C11
4,µ7
R15
1E
R14
50K1
R13
10K
36K5
R18
C12
3,µ3
0V
MS8
511K
R37
511K
R17
27M4
R42
0V
825E
R19
V20
BZX79
B5V1
V21
BZX79
B5V6
MS12
MS9
1
0V
5
6
LM1458
A2B
7
R39
2M2
C14
10n
V18
BZX79
C2V4
V17
BZX79
C5V6
0V
R20
1K
V4
BCY58
C15
22n
R43
110E
+15V
+15V
9E92
R22
V3
BSW68
110E
R21
MS10
X2:B7
300V
X2:B4
600V
X2:A1
920V


C18
C19
C20
C21
L1
V1

XTV Camera



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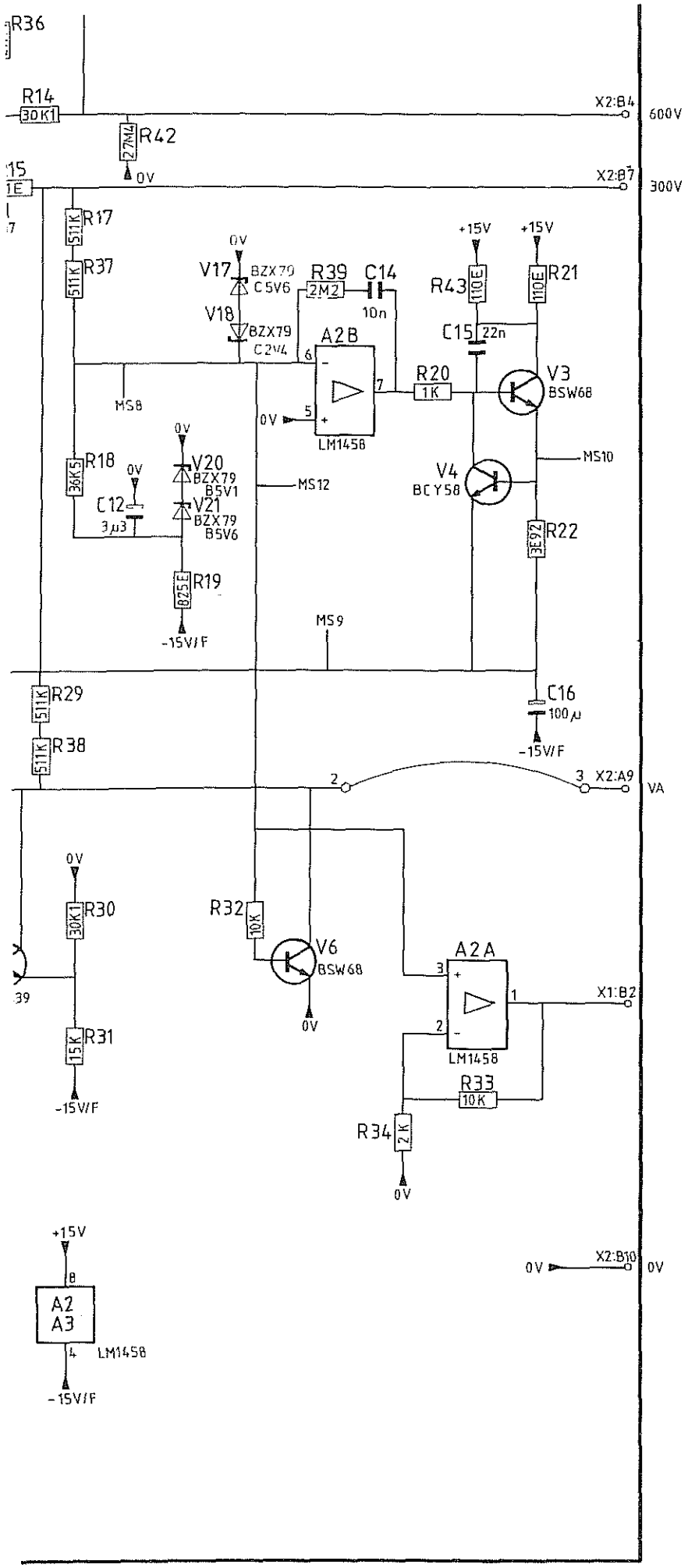

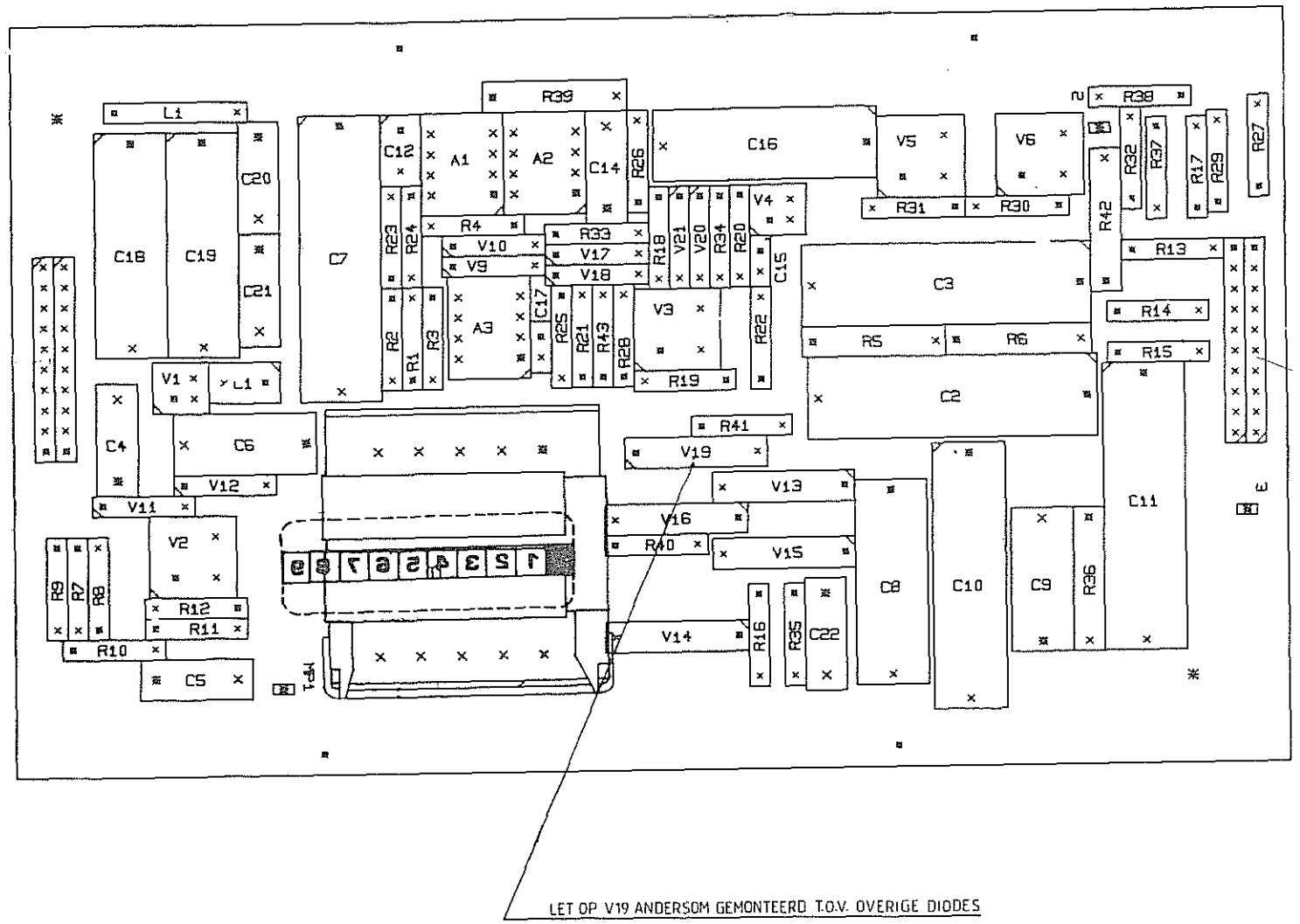

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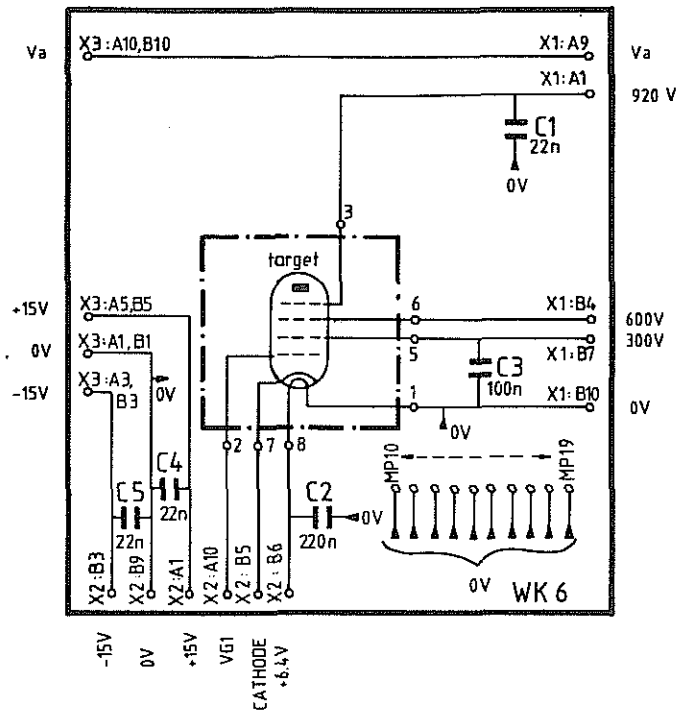
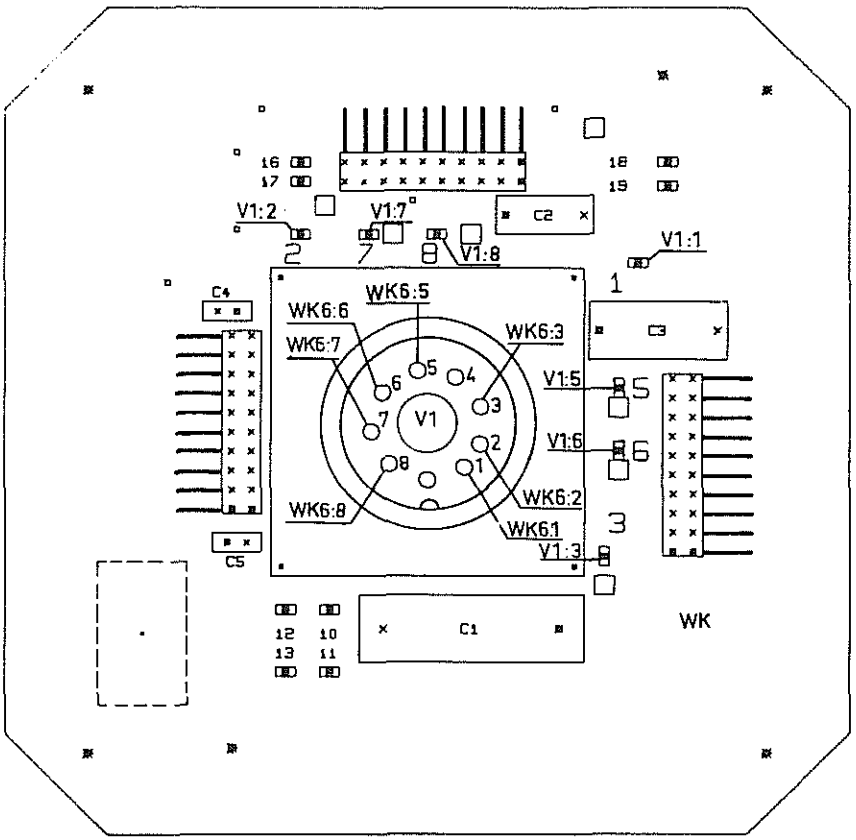


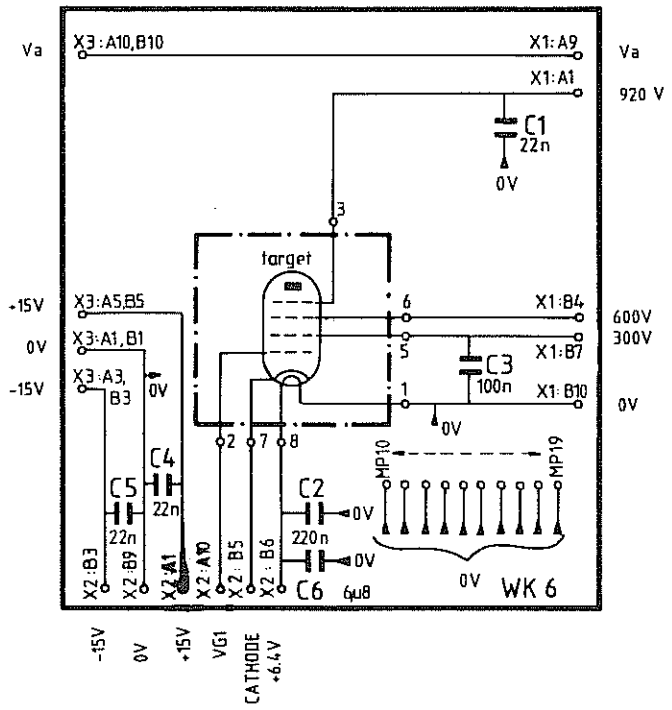
DETAIL 1: CIRCUIT DIAGRAM



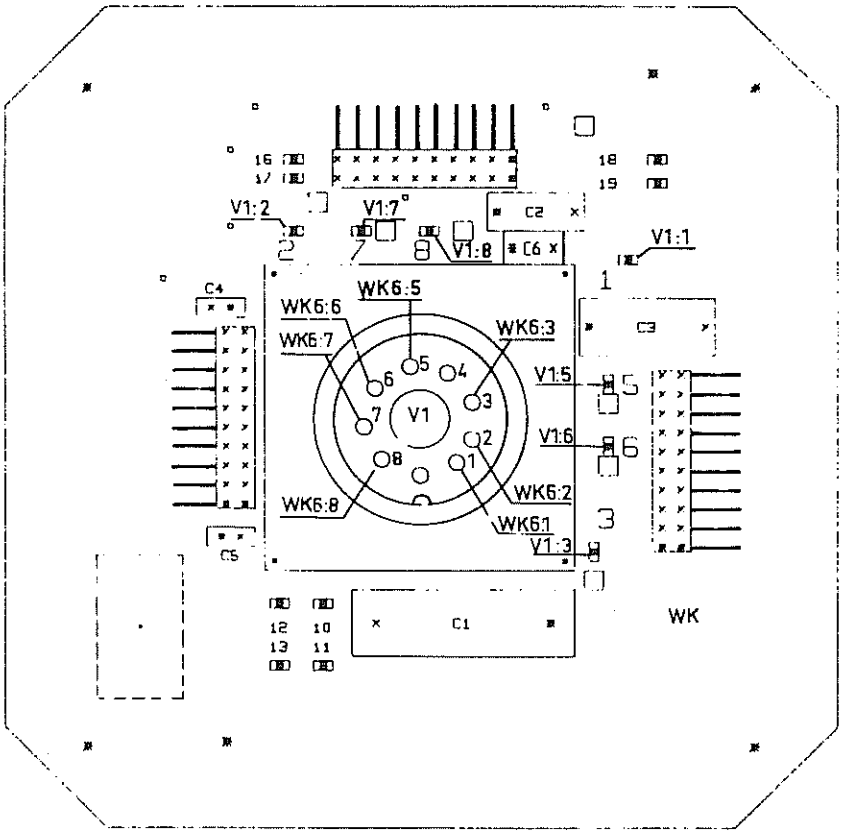
DETAIL 2: PRINTED CIRCUIT BOARD LAYOUT

WK6

TUBE INTERFACE
4522 107 71503



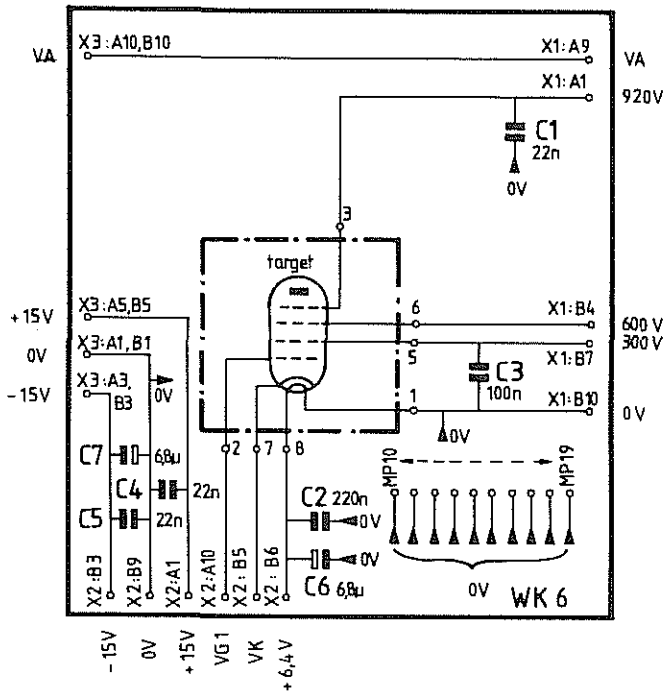
DETAIL 1: CIRCUIT DIAGRAM



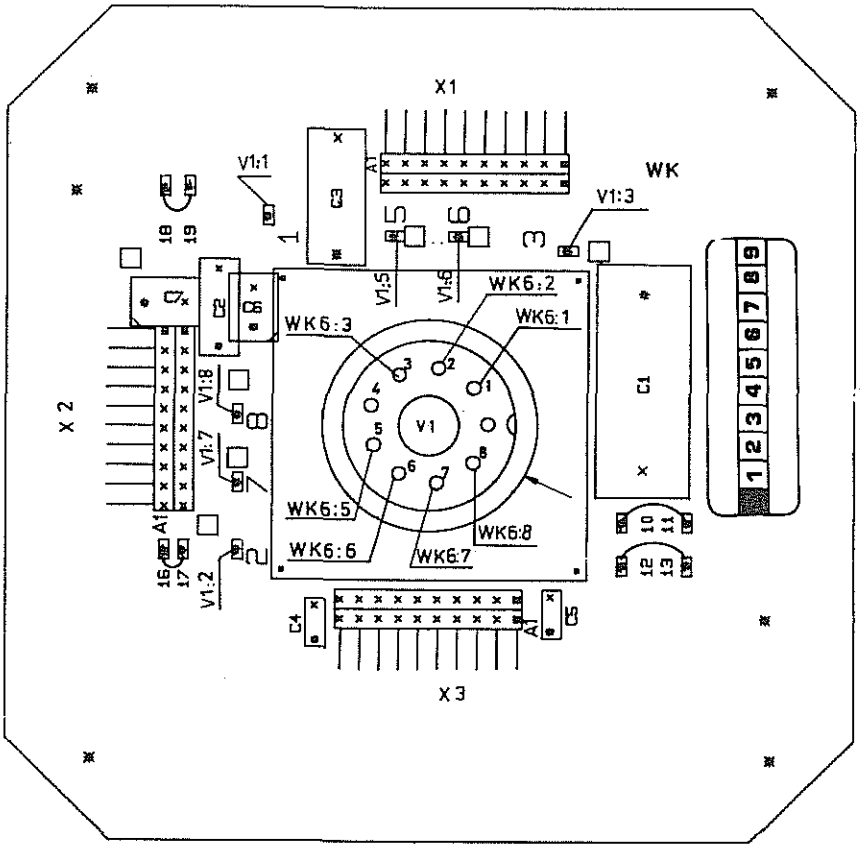
DETAIL 2: PRINTED CIRCUIT BOARD LAYOUT

WK6

TUBE INTERFACE 4522 107 71504	3



DETAIL 1 : CIRCUIT DIAGRAM



DETAIL 2 : PRINTED CIRCUIT BOARD LAYOUT

WK6

TUBE INTERFACE
4522 107 71505

3

SERVICE MANUAL - UNIT
6' I.I. COMPACT GENERATOR
TYPE NO. : 9807 140 20301

SERIAL NO. :

Manual codenumber : 4522 983 14011

List of Pages and Drawings

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4 (85.0)E
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Adjusting potentiometers R1/R2 26
Simplified diagram of the Compact Generator Z1-1
Wiring 6" I.I.Compact Generator Z2-1
Dimension sketch Z9-1

1. INTRODUCTION AND TECHNICAL DATA

1.1. PURPOSE

The 6" I.I.Compact Generator has been developed to supply the 6" S2 I.I. tubes.

This High Voltage Cascade Generator provides:

- adjustable cathode voltage
- adjustable focusing voltage
- continuous ion pump voltage
- anode voltage (earth potential)

1.2. VERSIONS

9807 140 20301: For use with 6" I.I. tube in the BV25

1.3. ITEMS SUPPLIED

- 6" I.I.Compact Generator (See page 25)

1.4. EQUIPMENT IDENTIFICATION

The type number plate is located on the generator

1.5. TECHNICAL DATA

1.5.1. Dimensions and weights

Dimension : See dimension sketch on page 26
Weight : ~ 2.3 kg

1.5.2. Electrical Data

The high Voltage Cascade Generator comprises a 25 kHz oscillator for transforming a high voltage, which is followed by a 4.5 stage multiplier.
All H.V. output voltages are protected against overvoltage and overcurrent.
All H.V. output voltages are short circuit proof.

(1) Input Data

Supply Voltage : +15V±10%; -15V±10%
Current consumption : <250 mA

(2) Output data

Voltages		Min.	Max.
Cathode (adjustable)	Vc	-10 kV	-25 kV
Focusing (adjustable)	Vf	-9.76 kV	-24.8 kV
Range focusing	Vf	160 V	400 V
Anode		0 V	0 V
Ion pump		-2kV +15%	-2kV -15%

(3) General

Load current of cathode : Ic < 15 uA
Load current of focusing electrode: If < 15 uA
Load current of ion pump : Ip < 20 uA

(4) Control signals

The control signals are given with respect to the 0 V common of the ±15 V generator supply.
Signal level: according to 15V LOCMOS.

- Reset Input Signal
  Alarm Reset : ALRS - HC
  Level : +7.5 V < Vin < +15 V
  Input impedance: 10 kohm
  Reset time : tr > 200 ms
  Location : BGX1:B4

- Alarm Output Signal
  HV Generator Alarm: HVGAL - H
  Level : +11V < Vout < +15V
  Output impedance : 10 kohm
  Alarm time : continuous
  Location : BGX1:B2

1.5.3. Environmental Data

Ambient temperature : +10°C to +55°C

1.5.4. Applicable Standards

- IEC 601-1; A.P.
- UL 187
- CSA c22.2 nr.114

2. INSTALLATION

2.1. INTRODUCTION

This section contains general mounting instructions. For information relating to the system, see the BV25 System Manual.

2.2. TOOLS AND TESTEQUIPMENT

This equipment can be installed with a standard toolset. Equipment needed during subsequent adjustment and functional testing is listed in paragraph 3,SETTING TO WORK.

2.3. INSTALLATION INSTRUCTIONS

2.3.1. Mechanical

Fit the unit with 4 screws M4 x 12 to the destinated mounting plate in the BV25 stand, see also the BV25 SYSTEM MANUAL.

2.3.2. Electrical

Remove the caps from the HV-plugs of the generator. Grease the HV-plugs with silicon grease, codenr. 1312 501 48202, and connect the plugs to the I1-tube according Z1-1.

Cathode HVC11	BG:1	-	BBX1
Focusing HVF11	BG:2	-	BBX2
Ion Pump HVP11	BG:3	-	BBX4
Anode	BG		
Earth ( )	BG1		

CAUTION
HIGH VOLTAGE WILL BE PRESENT ON THE CONNECTORS WHEN THE LOW VOLTAGE SUPPLY IS SWITCHED-ON.

Connect the low voltage supply cable to the connector BGX1 of the compact generator.

Generator	Function
BGX1:A1	-15V supply
BGX1:A3,B3	0 V
BGX1:A5	+15V
BGX1:B2	High voltage alarm
BGX1:B4	Alarm reset

3. SETTING TO WORK

This section contains general adjustment and test data. For information relating to specific system configurations refer to the BV25 SYSTEM- and IMAGE Quality MANUAL.

3.2. EQUIPMENT REQUIRED

The tools and test equipment needed during adjustment and functional testing are:

- standard toolset
- multimeter (Ri > 10 Mohm)
- X-Ray photometer

3.3. SETTING UP AND TESTING

3.3.1. Adjusting the Cathode Voltage

Note :
Take measures for X-Ray protection before adjusting the cathode voltage. See BV25 System manual, /section Corrective Maintenance.

The cathode voltage is factory adjusted and needs no adjustment.Only in case of reducing the intensification (Gx is dependent of the high voltage) the high voltage can be adjusted by means of BGR1, see page 25. The procedure for reducing the intensification (Gx) is described in the BV25 SYSTEM MANUAL.

Measuring point: MP2 - MP3

test voltage : $V_{MP_{2-3}} = \frac{Vc}{5000}$

3.3.2. Adjusting the Focusing Voltage

The focusing voltage of the I.I. tube can be adjusted by means of BGR2 (see page 25), until maximum sharpness is obtained. Adjustment can be made with an X-Ray photometer.

The procedure for focusing the I.I. tube is given in the service instructions of the relevant meter.

Measuring point: MP4 - MP1

Test voltage : $V_{MP_{4-1}} = \frac{3}{100}Vf$

3.4. FAULT INDICATOR BGH1

Location: See page 25
Function: Overvoltage (Vc) and overcurrent
Colour : Red

4. CORRECTIVE MAINTENANCE

See the instructions in the BV25 System Manual.

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ILLUSTRATION

6" BV-Kompact Generator 25
Einstellung Potentiometers R1/R2 26
Schaltbild Kompact Generator Z1-1
Verdrahtung 6" BV-Kompact Generator Z2-1
Abmessungsskizze Z9-1

1. EINLEITUNG & TECHNISCHE DATEN

1.1. VERWENDUNGSZWECK

Der 6" BV-Kompact Generator wurde fuer die Stromversorgung der 6" S2 Bildverstärkerröhren *entwickelt*.

Dieser Hochspannung Kaskaden Generator liefert:

- einstellbare Kathodenspannung
- einstellbare Fokussierspannung
- ständige Ionenpumpen-Spannung
- Anodenspannung (Erdpotential)

1.2. AUSFUEHRUNGEN

9807 140 20301:Für Anwendung mit 6" BV-Röhre im BV25

1.3. GELIEFERTE TEILE

- 6" BV-Kompact Generator (Siehe Blatt 25)

1.4. KENNZEICHNUNG DES GERAETS

Der Typennummerplatte ist auf dem Generatorgehäuse montiert.

1.5. TECHNISCHE DATEN

1.5.1. Abmessungen und Gewichte

- Abmessung: Siehe Maszskizze Blatt 26
- Gewicht : ~ 2,3 kg

1.5.2. Elektrische Daten

Der Hochspannung Kaskadengenerator enthält einen 25 kHz-Oszillator, der eine hohe Wechselspannung liefert, der eine 4,5 fache Vervielfacherstufe nachgeschaltet ist.
Die Hochspannungsausgangen sind gegen Ueberspannung und Ueberstrom gesichert.
Die Hochspannungsausgangen sind gegen Kurzschluss gesichert.

(1) Eingangsdaten

Speisespannung : +15V+10%; -15V+10%
Stromaufnahme : < 250 mA

(2) Ausgangsdaten

Spannungen	Minimal	Maximal
Kathode HVC11 (einstellbar)	-10 kV	-25kV
Fokussierung HVF11 (einstellbar)	-9,76 kV	-24,8 kV
Fokussierbereich Vf	160 V	400 V
Anode	0 V	0 V
Ionenpumpe	-2 kV+15%	-2kV-15%

(3) Allgemeines

Belastungsstrom der Kathode : Ic < 15 uA
Belastungsstrom der Fokussierungselektrode : If < 15 uA
Belastungsstrom der Ionenpumpe : Ip < 20 uA

(4) Steuersignale

Die Steuersignale sind in bezug auf die gemeinsamen 0V der Betriebsspannungen von + und -15V angegeben.
Signalpegel entspricht 15V LOCMOS.

- Rückstell-Eingangssignal
  Alarmrückstellung: ALRS - HC
  Pegel : +7,5V<V_{in}<+15V
  Eingangsimpedanz : 10 kOhm
  Rückstellzeit : t_r > 200 ms
  Punkt : BGX1:B4

- Alarm- Ausgangssignal
  Hochspannungsgenerator-Alarm: HVGAL - H
  Pegel : +11V< V_{out}<+15V
  Ausgangsimpedanz : 1 kOhm
  Alarmzeit : kontinuierlich
  Punkt : BGX1X1:B2

1.5.3. Umgebungsbedingungen

Temperaturbereich: +10° bis +55°C

1.5.4. Diesbezügliche Normen

- IEC 601-1; A.P.
- UL 187
- CSA c22.2 nr.114

2. MONTAGE

2.1. EINLEITUNG

Dieser Abschnitt enthält allgemeine Montageanweisungen. Für Angaben über die Montage des Subsystems siehe die entsprechende BV25 BV/TV- SYSTEM-ANLEITUNG.

2.2. WERKZEUG UND PRUEFGERAETE

Diese Einheit lässt sich mit normalem Werkzeug montieren.Die für die anschliessende Einstellung und die Funktionsprüfung benötigten Geräte sind in Punkt 3, "INBETRIEBNAHME", aufgeführt.

2.3. MONTAGEANWEISUNGEN

2.3.1. Mechanisch

Die Einheit mit vier Schrauben M4 x 12 an der betreffenden Montageplatte des BV25 Stativs anbringen, siehe auch die BV25 SYSTEM-ANLEITUNG.

2.3.2. Elektrisch

Entfern die Schutzkappe der Hochspannungssteckers. Fett die Hochspannungssteckers ein mit Silikonenfett, Kodenummer 1312 501 48202, und schliess die Steckers an der Bildverstakerröhre gemäss Z1-1.

Kathode	BG:1	-	BBX1
Fokussierung	BG:2	-	BBX2
Ionenpumpe	BG:3	-	BBX4
Anode	BG1		
Erde ( )	BG1		

WARNUNG
Sobald die Speisespannung angeschlossen und eingeschaltet wird ist HOCHSPANNUNG anwesend auf die Steckers.

Schliess die Speisespannungskabel an Konnektor BGX1 des Kompaktgenerators.

Generator	Funktion
BGX1:A1	-15V speisespannung
BGX1:A3,B3	0V
BGX1:A5	+15V speisespannung
BGX1:B2	Hochspannungsalarm
BGX1:B4	Alarmrückstellung

3. INBETRIEBNAHME

3.1. EINLEITUNG

Dieser Abschnitt enthält allgemeine Einstellungs- und Prüfdaten.
Für Angaben über die spezifischen Systemkonfigurationen siehe die entsprechende BV25 SYSTEM-ANLEITUNG

3.2. ERFORDERLICHE GERAETE

Für die Einstellung und für die Funktionsprüfung werden folgende Werkzeuge und Geräte benötigt:

- normales Werkzeug
- Vielfachmessgerät (Ri> 10 MOhm)
- Röntgenphotometer

3.3. AUFSTELLUNG UND PRUEFUNG

3.3.1. Einstellen der Kathodenspannung (HVC1I)

Achtung :
Während Kalibrierung Strahlenschutz beachten. Siehe die BV25 System Anleitung unter "Korrektive Wartung".

Die Hochspannung und damit die Bildverstärkung (Gx) der Röhre lässt sich mit BG1R1 einstellen (siehe Blatt 25)
Die Kathodenspannung wurde in der Fabrik auf -25 kV eingestellt. Wie diese Bildverstärkung herabgesetzt werden kann, siehe die BV25 SYSTEM-ANLEITUNG.

Messpunkt : MP2 - MP3
Prüfspannung: $V_{MP_{2-3}} = \frac{Vc}{5000}$

3.3.2. Einstellen der Fokussierspannung HVF1I

Die Fokussierspannung der Bildverstärkerröhre lässt sich mit BG1R2 (siehe Blatt 25) einstellen, bis die maximale Schärfe erreicht ist. Die Einstellung kann mit einem Röntgenphotometer erfolgt werden.

Wie die Bildverstärkerröhre fokussiert wird, ist in der Service-Anleitung des betreffenden Instruments angegeben.

Messpunkt : MP4 - MP1
Prüfspannung: $V_{MP_{4-1}} = \frac{3}{100}$ Vf

3.4. SERVICE-INDIKATOREN

3.4.1. Fehlerindikator BGH1

Lage : Siehe Blatt 25.
Funktion: Ueberspannung (Vc) und Ueberstrom.
Farbe : Rot.

4. KORREKTIVE WARTUNG

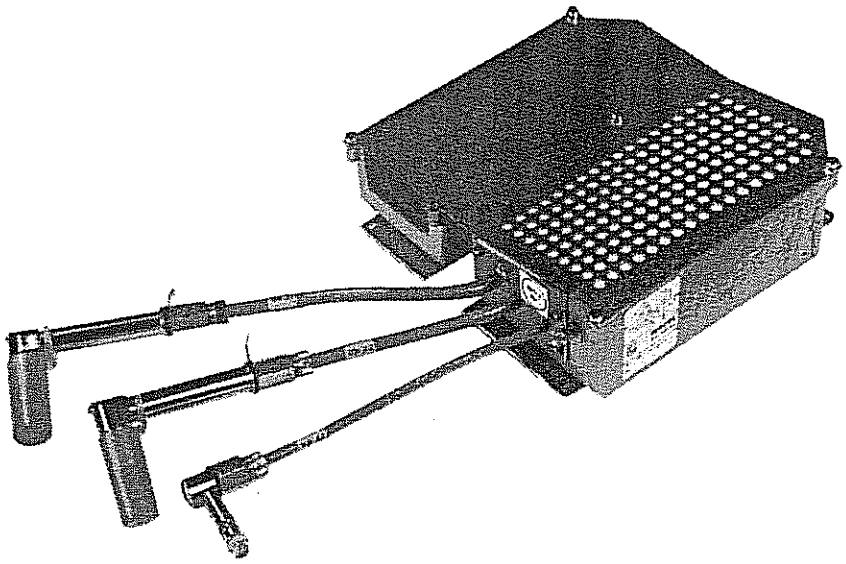
Siehe die Anweisungen in der BV25 SYSTEM-ANLEITUNG.

SERVICE MANUAL-UNIT

6" I.I. Compact Generator

9807 140 20301

For serial numbers, see list of pages and drawings.



Application: This generator is suitable to supply the 6" S2 I.I. tube in the BV25.

IPC: EINDHOVEN

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Dibujo dimensional Z9-1

1. INTRODUCCION Y DATOS TECNICOS

1.1. FINALIDAD

El generador compacto del tubo de I1 de 6" de ha sido desarrollada para alimentar el tubo de 6" de BV25.

Este generador en cascada de alta tensión ofrece:

- tensión catódica ajustable
- tensión de enfoque ajustable
- tensión continua de la bomba de iones
- tensión del ánodo (potencial de tierra)

1.2. VERSIONES

9807 140 20301: Para aplicación del tubo de 6" de BV25.

1.3. COMPONENTES ENTREGADOS

- Generador Compacto del tubo de 6"(ver página 25)

1.4. IDENTIFICACION DEL EQUIPO

El emplazamiento de placa con el número de tipo puede verse en el generador.

1.5. DATOS TECNICOS

1.5.1. Dimensiones y Pesos

Dimensiones: Ver el dibujo dimensional, página 26.
Pesos : ~ 2,3 kg

1.5.2. Datos Electricos

El generador en cascada de alta tensión comprende un oscilador de 25 kHz para la transformacio'n de alta tensión, que es sequido por un multiplicador de 4,5 etapas.
Todas las tensiones de salida de alta tensión están protegidas contra sobretensión y sobrecorriente.
Todas las tensiones de salida de alta tensión están protegidas contra cortocircuito.

(1) Datos de entrada
Tensión de alimentación: +15V±10%; -15V±10%
Consumo de corriente : < 250 mA

(2) Datos de salida

Tensiones	Min.	Máx.
Catódica (ajustable)Vc	-10 kV	-25 kV
Enfoque (ajustable)Vf	-9,76 kV	-24,8 kV
Enfoque de alcance Vf	160 V	400 V
anodo	0 V	0 V
Bomba de iones	-2 kV +15%	-2 kV -15%

(3) Generalidades

Corriente de carga de catódica : < 15 uA
Corriente de carga de électrode enfoque : < 15 uA
Corriente de carga de bomba de iones : < 20 uA

(4) Señales de control

Las señales de control se dan respecto a 0 V común de los generadores de alimentación de ± 15 V.
Nivel de señal: según 15 V LOCMOS.

- Reajuste de la señal de entrada
  Reajuste de alarma : ALRS - HC
  Nivel : +7,5V < Vin < +15V
  Impedancia de entrada : 10 kOhm
  Tiempo de reajuste : t_r > 200 ms
  Emplazamiento : BGX1:B4

- Señal de salida de alarma
  Alarma del generador de alta tensión: HVGAL-H
  Nivel : +11V < Vout < +15V
  Impedancia de salida : 1 kOhm
  Tiempo de alarma : continuo
  Emplazamiento : BGX1:B2

1.5.3. Datos Ambientales

Temperatura ambiente : +10°C hasta +55°C

1.5.4. Normas Aplicables

- IEC 601-1; A.P.
- UL 187
- CSA c22.2 nr.114

2. INSTALACION

2.1. INTRODUCCION

Esta sección contiene instrucciones generales para el montaje. Para información relativa al sistema específico a instalar, ver el MANUEL correspondiente al SISTEMA de BV25.

2.2. HERRAMIENTAS Y EQUIPO DE PRUEBA

Este equipo puede instalarse con un juego de herramientas ordinario. El equipo necesario durante los ajuste subsiquientes y pruebas de functionamiento están enumerados en la punto 3: PUESTA EN FUNCTIONAMIENTO.

2.3. INSTRUCCIONES PARA LA INSTALACION

2.3.1. Mecánico

Fijar la unidad con 4 tornillos M4 x 12 a la placa de montaje del trípode metálico de BV25 destinada para ello, también ver le MANUEL del SISTEMA de BV25.

2.3.2. Elétrico

Alejar las fundas de los conectores de alta tensión. Engrase los conectores de alta tensión con la grasa de silicone, numéro del codigo 1312 501 48202 y conectar los conectores en el tubo I.I.conforme a Z1-1.

Cátodo HVCII	BG:1	-	BBX1
Enfoque HVFII	BG:2	-	BBX2
Bombadeiones HVPII	BG:3	-	BBX3
Anodo	BG1		
Tierra	BG1		

AVISO

En cuanto l'alimentación se conectara, la alta tensión hallarse existente sobre los conectores de alta tensión.

Conectar el cable d'alimentación en el conector BGX1 del generador compacto.

Generador	Función
BGX1:A1	-15V
BGX1:A3,B3	0V
BGX1:A5	+15V
BGX1:B2	Señal de alarma
BGX1:B4	Reajuste de alarma

3. PUESTA EN FUNCIONAMIENTO

3.1. INTRODUCCION

Esta sección contiene datos generales sobre ajuste y prueba. Para información referente a las configuraciónes específicas del sistema, consultar el MANUEL DEL SISTEMA de BV25.

3.2. EQUIPO NECESARIO

Las herramientas y equipo de prueba necesarios durante el ajuste y pruebas de funcionamiento son:

- juego de herramientas standard
- multímetro (Ri > 10 MOhm)
- fotómetro de rayos X

3.3. MONTAJE Y PRUEBA

3.3.1. Ajuste de la tension del Catodo HVCI1

Nota :
Pensar en la protección del haz de rayos X durante de adjuste de la tensión de focalización.
Consulte el manual para de la Sistema de BV25, ver capitulo MANTENIMIENTO DE CORRECCION.

La alta tensión del tubo I.I. y, por consiquiente, la intensificación (Gx) del tubo I.I.puede ajustarse mediante BGR1 (ver página 25).La tensión del cátodo víene ajustada de fábrica a -25 kV.
El procedimiento para reducir la intensificación(Gx) se describe en el MANUEL DEL SISTEMA de BV25.

Punto de medición: MP2 - MP3
Tensión de prueba: $V_{MP_{2-3}} = \frac{Vc}{5000}$

3.3.2. Ajuste de la tension de enfoque HVFI1

La tensión de enfoque del tubo I.I. puede ajustarse mediante BGR2, (ver página 25), hasta que se obtenga el máximo de nitedez. El ajuste puede hacerse con un fotómetro de rayos X.
El procedimiento para enfocar el tubo I.I. se indica en las instrucciones de servicio del medidor en cuestión.

Punto de medición: MP4 - MP1
Tensión de prueba: $V_{MP_{4-1}} = \frac{3}{100}$ Vf

3.4. INDICADORES DE SERVICIO

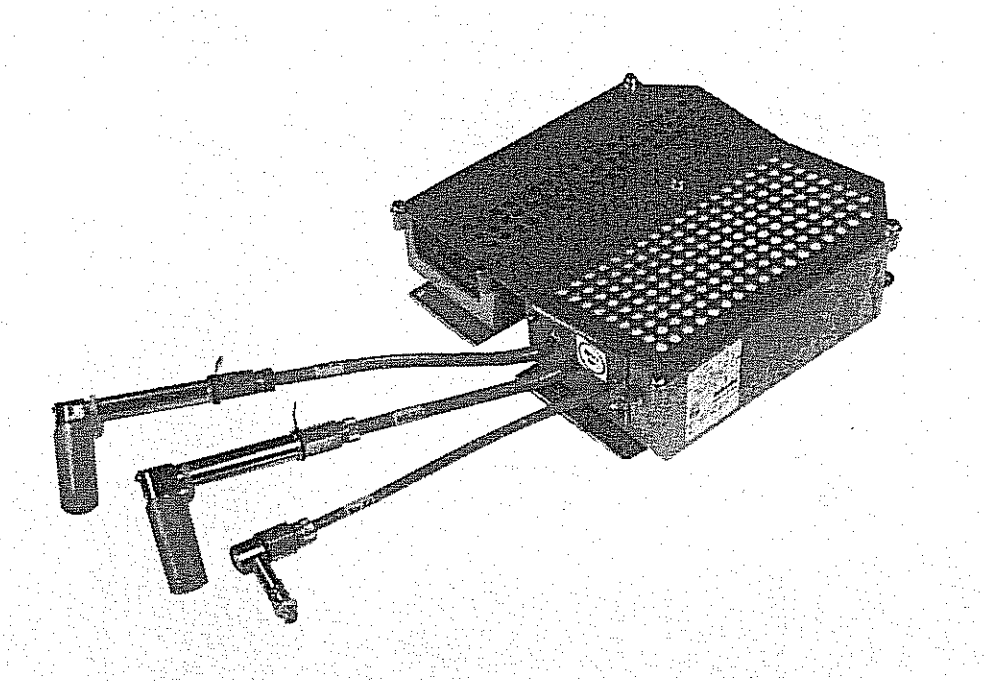
3.4.1. Indicador de Averia BGH1

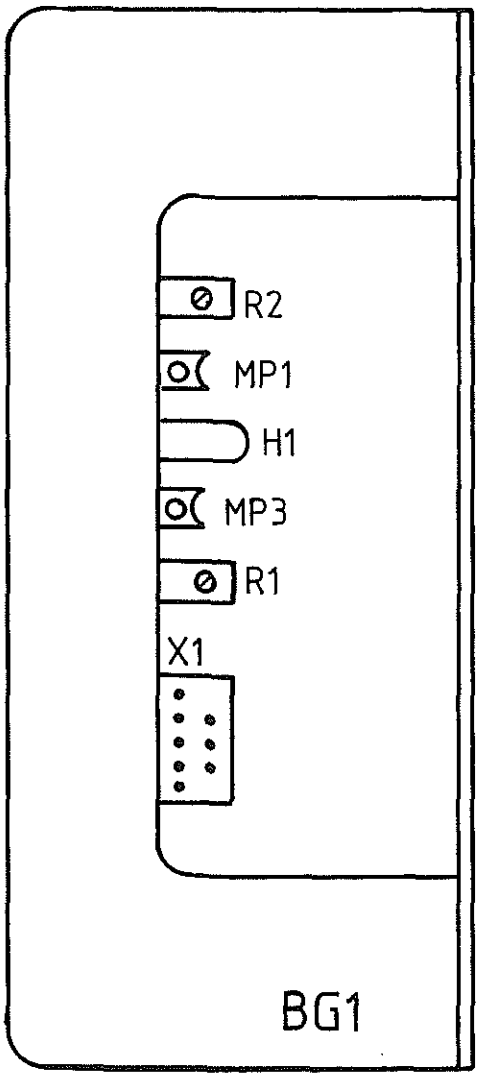
Emplazamiento: Ver página 25.
Función : sobretensión (Vc) y sobrecorriente
Color : rojo

4. MANTENIMIENTO DE CORRECCION

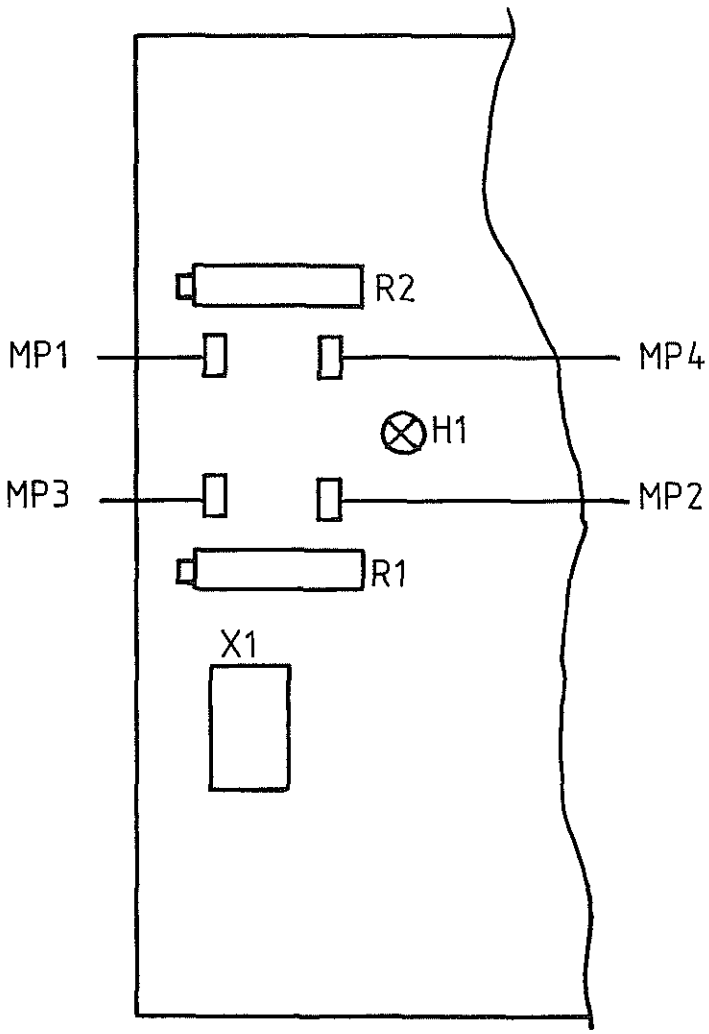
Consultar por las instrucciones el MANUEL DEL SISTEMA de BV25

6" I.I. Compact Generator





SIDE VIEW



COMPONENT SIDE

PHILIPS

Philips Medical Systems

parts list

Philips Medical Systems Nederland B.V.| Technical Service| Best

SERVICE PARTSLIST UNIT

PEI: 9807 140 20.01

DESCRIPTION: HT cascade gen. for 15cm II.

SERIAL NR:

List of pages and drawings

P-00	88.0	
P-1	86.0	9807 140 20001
P-2	86.0	9807 140 20101
P-3	88.0	9807 140 20201
P-4	88.0	9807 140 20301

*printing instructions 4522 983 27491

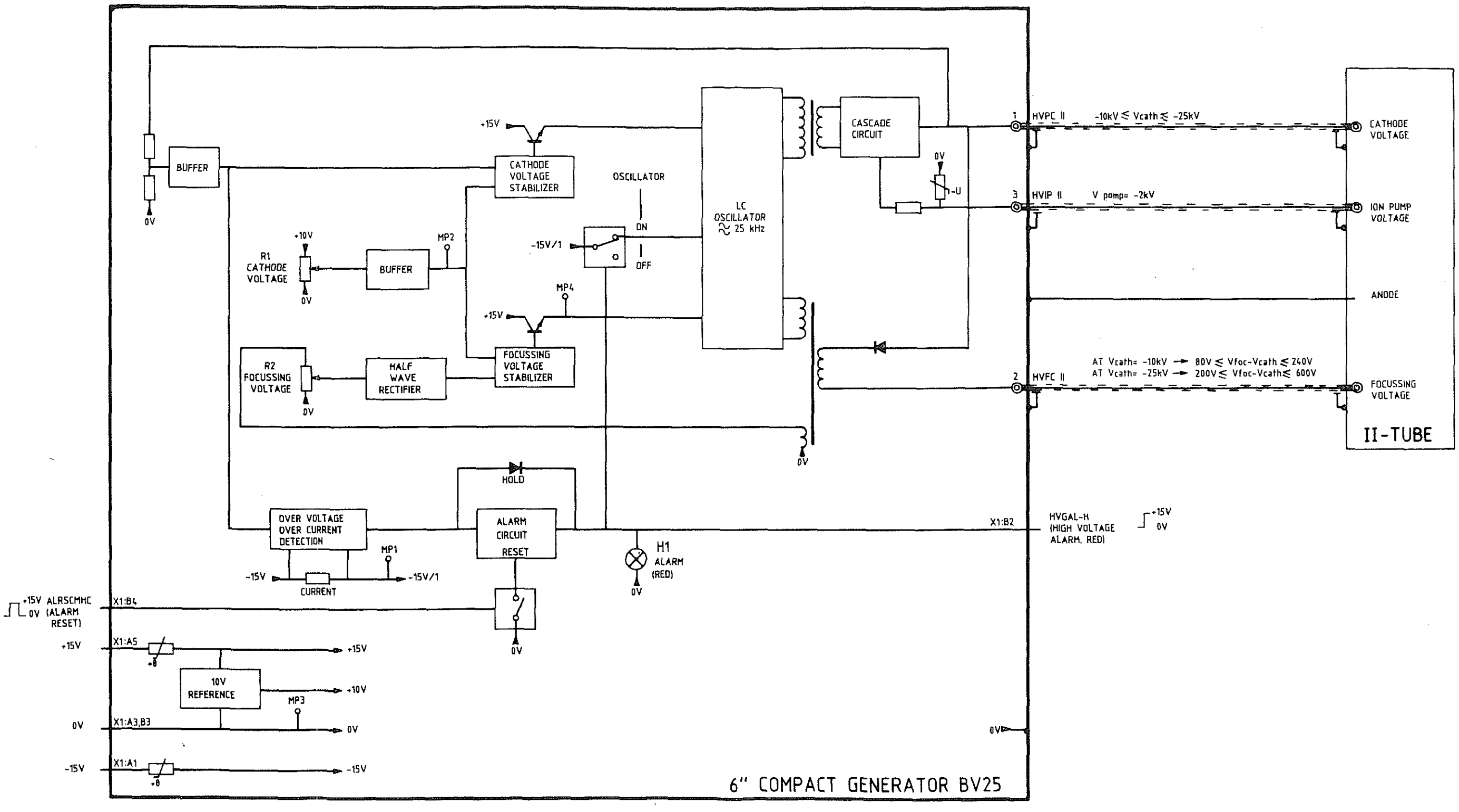
SCHEME/ PAGE	INDEX	CODENUMBER	DESCRIPTION	DATA
Z3.1	BG1	4522 103 24424	comp. 6" casc. generator	
Z3.1	BG1A1	9334 643 70682	IC Volt ref.	AD581J

SCHEME/ PAGE	INDEX	CODENUMBER	DESCRIPTION	DATA
Z2.1	BG1X1/BG2X2	2422 034 11976	ModV contact	18x
Z2.1	BG1X1/BG2X2	2422 025 02198	connector housing ModV	2x5p 2x
Z2.1	BG2X1	2422 034 11976	ModV contact	5x
Z2.1	BG2X1	2422 025 01611	MODV connector hous. 2x4p	
Z2.1	BGX1	2422 015 12247	pincontact 0,14	3x
Z2.1	BGX1	2422 015 12272	pincontact 0,5	2x
Z2.1	BGX1-BGX2	4512 101 48002	pinconnector housing	10p 2x
Z2.1	BGX3	4522 103 24301	connector 25KV	
Z2.1	BGZ1	2722 171 03024	power supply 15V 0,5A	PM396D
Z3.1	BG1	4522 103 24424	compact 6"casc. generator	
Z3.1	BG1A1	9334 643 70682	IC volt ref.	AD581J
Z3.2	BG2	4522 107 75902	interface 6" generator	

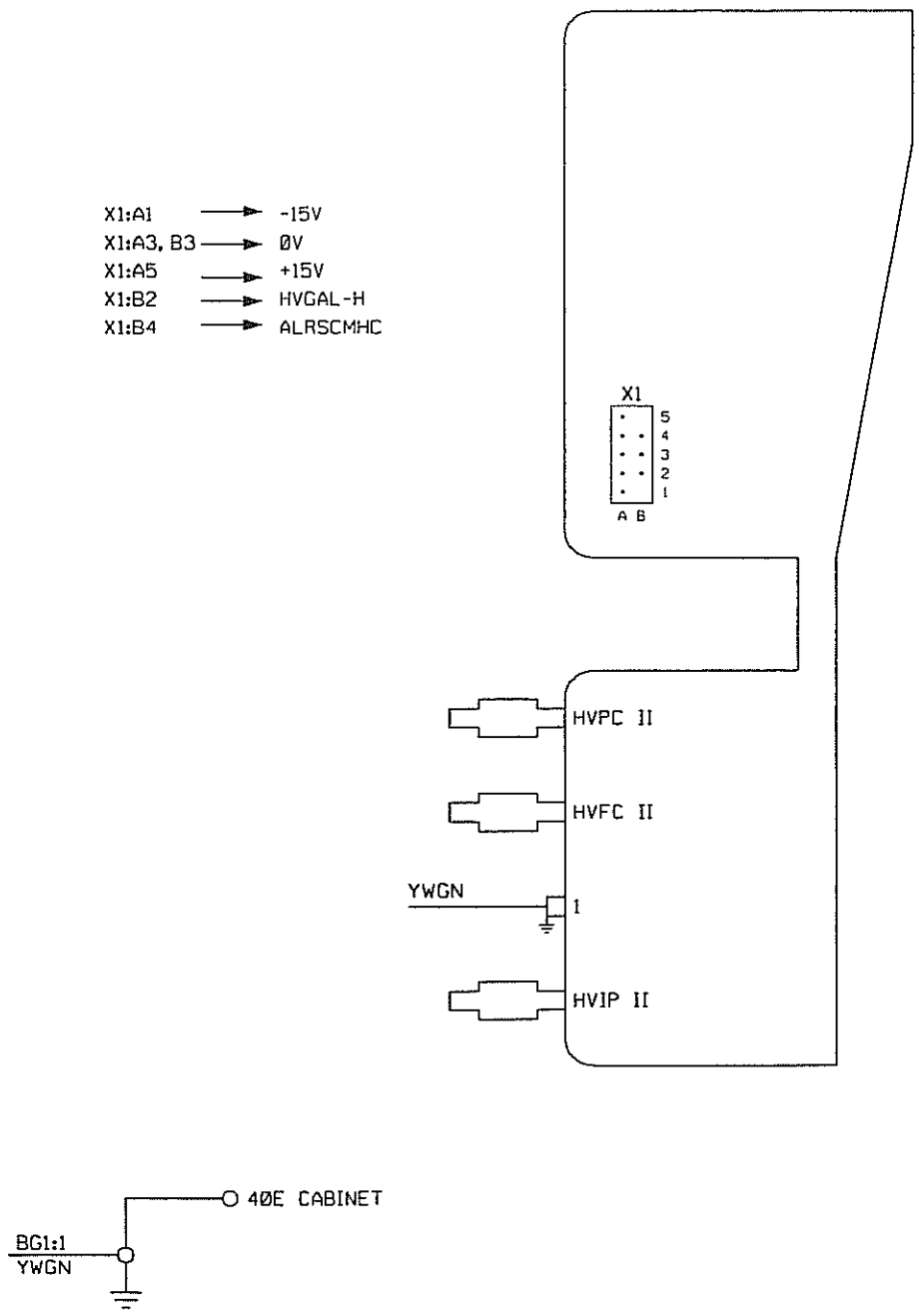
SCHEME/ PAGE	INDEX	CODENUMBER	DESCRIPTION	DATA
Z2.2	BG1X1	2522 034 11976	MODV contact	2x
Z2.2	BG1X1	2422 025 02198	connector housing MODV	10p
Z2.2	BG200	4512 916 50965	connection strip	2x
Z2.2	BG200	4512 126 25581	term. block 28p	
Z2.2	BGZ1	2722 171 03024	power supply 15V 0,5A	PM369D
Z3.1	BG1	4522 103 24424	compact 6" cascade gen.	
Z3.1	BG1A1	9334 643 70682	IC volt ref.	AD581J

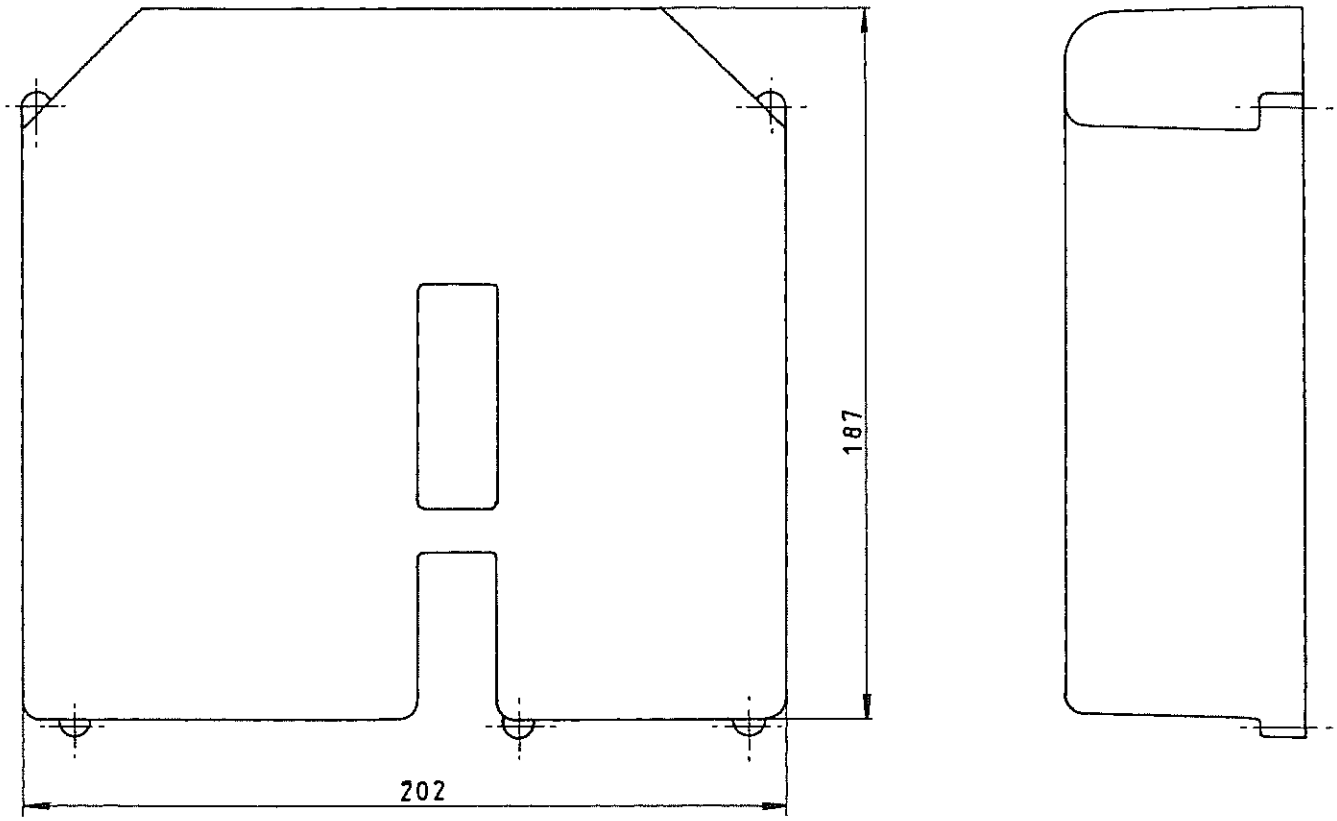
SCHEME/ PAGE	INDEX	CODENUMBER	DESCRIPTION	DATA
		4522 103 74904	cable assy	
		1312 501 48202	silicone paste	

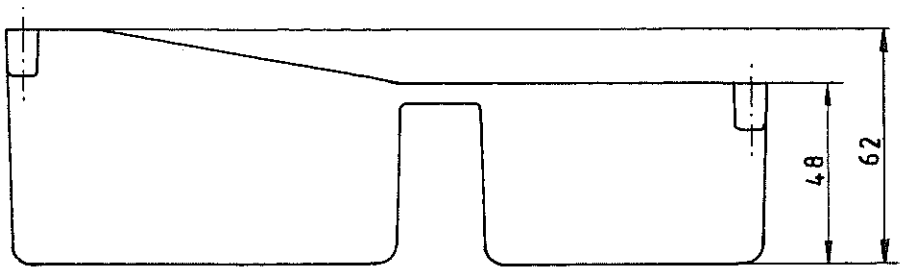
High Tension Cascade Generator
For 6" II Tube



6" COMPACT GENERATOR BV25


X1:A1 → -15V
X1:A3, B3 → 0V
X1:A5 → +15V
X1:B2 → HVGAL-H
X1:B4 → ALRSCMHC
X1
5
4
3
2
1
A B
HVPC II
HVFC II
YWGN
1
HVIP II
40E CABINET
BG1:1
YWGN





Dimensions in mm
(Scale 1:2)

FILING INSTRUCTIONS

This manual is part of the service documentation set for the XTV5 TV Chain. It should be filed with the service manual for the:

BV25

Additional binders can be ordered from IPC Eindhoven:

Capacity	Code Number
20 mm	4522 980 32141
26 mm	4522 980 31631
50 mm	4522 980 31641
65 mm	4522 980 31651

SERVICE MANUAL-UNIT

XTV5 Camera Control Unit FB

4522 161 5028.

For serial numbers, see list of pages and drawings

IPC: Eindhoven

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SETTING TO WORK C

ACCEPTANCE D

PREVENTIVE MAINTENANCE E

CORRECTIVE MAINTENANCE F

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SERVICE INFORMATION N

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SERVICE MANUAL-UNIT
XTV5 CAMERA CONTROL UNIT FB
TYPE NR: 4522 161 5028.

SERIAL NR.:

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		F-4	(83.0)E	Z1-3	(83.0)		
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A-14	(83.0)E	F-18	(83.0)E				
		F-19	(83.0)E				
B-1	(83.0)E	F-20	(83.0)E				
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B-4	(83.0)E	F-23	(83.0)E				
		F-24	(83.0)E				
C-1	(83.0)E						
C-2	(83.0)E						
C-3	(83.0)E						
C-4	(83.0)E						
C-5	(83.0)E						
C-6	(83.0)E						
C-7	(83.0)E						
D-1	(83.0)E						
E-1	(83.0)E						
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PRINTING INSTRUCTIONS: 4522 983 10962

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1. PURPOSE

The XTV5 Camera Control Unit FB is used in fluoroscopy systems for television video processing and x-ray dose rate control.

2. VERSIONS

There are no versions of this control unit to date.

3. ITEMS SUPPLIED (Figure AZ-1)

- XTV5 Control Unit FB

3.1. EQUIPMENT ITEMS

3.1.1. Adaptation BV25 WN23

The Adaptation Board BV25 WN23 has three functions:

(a) The generation of analoge signals, fixed gain for the AGC/Id Board WN17 and dose rate adjust for the kV Control Board WN22.
(b) Buffering of relays switched by remote control commands.
(c) The generation of a 30 sec. delay pulse for dark current measurement circuit.

For additional information, see Section G.

3.1.2. Camera Control Board WN11

The Camera Control Board WN11 supplies the camera with signals and power necessary to operate the camera. For additional information on the camera control board WN11, see Section G.

3.1.3. Video Processing Board WN13

The Video Processing Board WN13 produces the video signal used by a T.V. monitor, and video signals used by the AGC/Id Board WN17 and the kV Control Board WN22. For additional information on the video processing board WN13, see Section G.

3.1.4. AGC/Id Board WN17

The AGC/Id Board WN17 produces automatic gain control (AGC) voltages and dark current (Id) compensation voltages. For additional information, see Section G.

3.1.5. Pulse Generator Board WN19

The Pulse Generator Board WN19 produces H- and V-pulsed, composite sync and composite blanking pulses. For additional infomration on the pulse generator board WN19, see Section G.

3.1.6. Monitoring Board WN21

The Monitoring Board WN21 produces H- and V-parabolic waveforms. For additional information on the monitoring board WN21, see Section G.

3.1.7. Back panel Board WN10

The Backpanel Board WN10 comprises. The XTV5 Camera Control Unit electrical connections, printed circuit board connectors, plug connection WN10X1 to the XTV5 Camera FB, and plug connection WN10X2 to the BV25.

3.1.8. KV Control Board WN22

The kV Control Board WN22 produces control signals which adjust the x-ray dose rate to correlate with the video signals. For additional information, see Section G.

3.1.9. Mechanical Sections

The XTV5 Camera Control Unit FB mechanical sections comprise a mounting plate; side casing; cover plate; two snap bushings; mounting screws, washers, and nuts; HEW certification plate; date plate; technical specifications plate; classification plate; administrative specifications plate; and the Philips identification plate. The service key is mounted on the cover plate.

3.2. CABLE SET

No cable set is supplied with XTV5 Camera Control Unit FB.
For cables and cable connections for the BV25, see the group level documentation for the BV25.

3.3. MOUNTING HARDWARE AND SMALL PARTS (Figure AZ-2)

The mounting hardware and small parts of the XTV5 Camera Control Unit FB comprise:

ITEM	SIZE	AMOUNT
MOUNTING SCREWS	M4 x 6	4
SPRING WASHERS	4.1	4
GROUND WASHERS	4.3 x 8	4

3.4. EQUIPMENT IDENTIFICATION

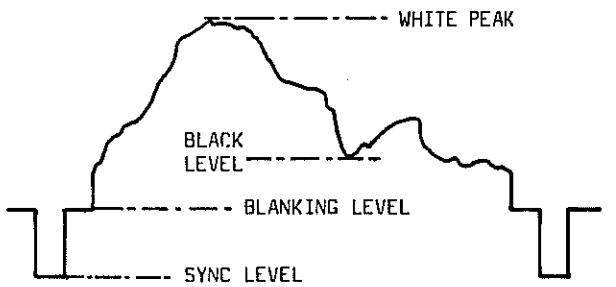
See Figure AZ-3 for the location of the identification labels and plates on the equipment items.

4. PERFORMANCE DATA

4.1. PERFORMANCE SPECIFICATIONS

POWER	Input Voltage 220V ± 10% transients -20% of nominal value 1 sec -25% of nominal value 10 msec spikes 500 Vt and 1000Vt Frequency 50 or 60Hz ± 1% Current 0.4A ON/OFF switch in cabinet
VIDEO PROCESSING AMPLIFIER	Bandwidth 15MHZ (-3dB) (flat within 1dB,1- 9MHz (ref.1MHz) Gain $0.69^{-0.2}_{+0}$ to $6.5^{-0}_{+0.85}$ Pulse Response overshoot ±5% Input impendance 75 Ω ± 5% l.f. drop at 250 kHz ≤ 2% l.f. drop at 50 Hz ≤ 4%

OUTPUT VIDEO VBS

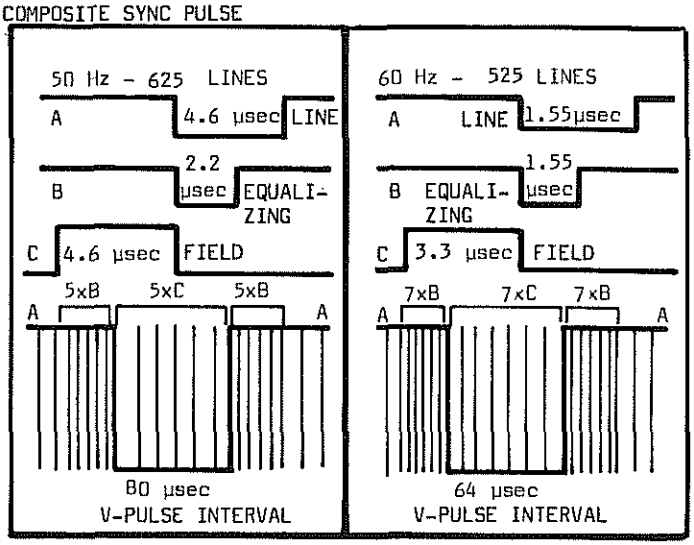


BLACK LEVEL	Inside picture area: 35 mV ± 10% During 15 $sec^{+100\%}_{-0}$ after switch-on, the black level is kept at 0V.
WHITE PEAK	TOP: 0.7V (video) ± 50 mVtt AVERAGE: 0.4V (video) ± 50mVtt
BLANKING LEVEL	0V
SYNC LEVEL	0.3V ± 0.5Vtt
$OUTPUT_{IMPEDANCE}$	75 Ω ± 5% (short-circuit proof)

VIDEO GAIN CONTROL	Both automatic and manual selection for Manual is done via a series of system related commands. Range: $0.69^{-0.2}_{+0}$ t_p $6.15^{-0}_{+0.85}$ (Both automatic and manual)

AUTOMATIC VIDEO GAIN CONTROL DETECTION	The time constant in the detection circuit is translated into a sensing area in the center of the picture (expressed as a fraction of the picture area). The measured output signal within this sensing area is twice the value of a "white" signal over the complete picture area. TOP: sensing area ≃ 0.3% AVERAGE: sensing area ≃ 2%
AUTOMATIC VIDEO GAIN STABILIZATION RESPONSE	≤ 0.1 sec (0-600 mV) ≤ 0.2 sec (80-1000mv)
WHITE CLIPPER	max. video output voltage 0.9V to 1Vtt
BRIGHTNESS STABILIZATION	By AGC and ADC
DARK CURRENT CONPENSATION	Both automatic and manual In automatic the compensation range is 0-100 nA^{+20}_{-0}. In manual, the compensation range is the same. Adjustments on printed circuit board. During dark current lock-in, there is a 10 msec delay.
MEASURING FIELD SELECTION	Internal or external on command. External: A signal synchronous to video signal within the blanking circle; amplitude; 5V positive. Internal: 2 circular fields, internally adjustable between 20% and 80% of blanking circle (large 20% - 80%; small 20% large). The AGC measuring field is coupled with the ADC measuring field. The difference in diameter of the measuring field is adjustable. 8 AGC= 8 ADC ± (0-2 µsec) (specified for 50 Hz-1249 lines).
STAND-BY OPERATION (CLEAN CIRLE)	Complete blanking of video signal during interruptions of the fluoroscopic examinations. Clean circle level: 35 mV ± 10%

COMPOSITE SYNC PULSE



Line time: 32 µsec for both 50- and 60 Hz

CIRCULAR BLANKING	Circle diameter: 37.1 µsec (50 Hz) 37.28 µsec (60 Hz) Circle mid-point: 13.0 µsec (50 Hz) 12.5 µsec (60 Hz)
RECTANGULAR BLANKING	Line blanking: 11.9 µsec (50 Hz) 11.1 µsec (60 Hz) Field blanking : 1.6 msec (50 Hz) 1.3 msec (60 Hz) Raster blanking : 50- (50 Hz) total lines 40- (60 Hz)
SCANNING	Interfaced 2:1, 625 lines per frame (50 Hz) or 525 lines per frame (60 Hz). Even lines or command, stabilization < 200 msec Synchronization: mains lock or crystal Mains lock: lock and hold region ± 2Hz (Mains lock-off command can be given). External sync out : 2 ± 0.5V across 75 Ω, negative going in : 1.5V-negative going Deflection: A circular image of max. 15.8 mm diameter at the target of the image tube must be made visible within the blanking circle (minimum: 7.9 mm) Geometry: Deviation 2%.

4.1. PERFORMANCE SPECIFICATIONS (Cont.)

HORIZONTAL SWEEP RATES	31, 250 Hz (625 lines per frame) 31, 500 Hz (525 lines per frmae)
VERTICAL SWEEP RATES	50- or 60 Hz
DOSE RATE CONTROL	Automatic or manual. Select manual mode via remote control switch. kV/mA LOCK-IN or mA HAND. Control is via a hand switch at x-ray generator panel. Input signal for automatic dose rate is proportional to the signal current of the image tube, with dark current compensation when active.
AUTOMATIC DOSE RATE CONTROL SETTINGS	TOP: sensing area 2% AVERAGE: sensing area 0.3% Two circular measuring fields are coupled to AGC measuring fields.
kV/mA CONTROL SIGNAL	The control signal is a symmetrical differential signal with respect to the ground potential; linearly proportional with the difference between the actual signal current and the nominal signal current. (+) (-) No signal current -6V +6V nominal signal current 0V 0V 200% signal current +6V -6V

4.2. INPUT/OUTPUT SPECIFICATIONS

Backpanel Board WN10

WN10X1 T.V. CAMERA CONNECTION

POINT	NAME	SPECIFICATION
A	0V	0V ± 2%
B	H-SHIFT	-9.5V ± 0.7 to +9.3V ± 1V
C	COMBINATION PULSE	See chart A-2
D	0V	0V ± 0.1V
E	H-SCAN REVERSE	0V to +15V (± 1V)
F	V-AMPLITUDE	0V to -10.2V ± 0.7V
H	+15V	+15V ± 2%
J	Va ADJUST	0V to +6.2V ± 0.4V
K	V-SHIFT	0V to +10V ± 0.7V
M	DYNAMIC FOCUS	0V to 6V ± 1V
N	Vg ADJUST	0V to -10.0V ± 0.7V
P	+6.4V	+6.4V ± 2%
R	H-AMPLITUDE	0.9 mA to 150-185 mA
S	TARGET NEG. PROT.	0V to $-5V^{-0.5V}_{+0.4V}$
U	STATIC FOCUS	81-94 mA to 148-179 mA
V	ALIGNMENT 1	$-9V^{+0}_{-1.9V}$ to $8.5V^{+2.2V}_{-0}$
W	-15V	-15V ± 2%
X	ALIGNMENT 2	$-9V^{+0}_{-1.9V}$ to $8.5V^{+2.2V}_{-0}$

WN10X2 BV25 CONNECTION

POINT	NAME	SPECIFICATION
A	NGC LONG TERM	0V to +15V (±10%)
B	T.V. KEY OUT	0Ω
C	H-SCAN REVERSE	0V to +15V (± 10%)
D	SELECT FIXED GAIN	0V to +15V (± 10%)
E	T.V. KEY IN	0Ω
F	DOSE RATE CONTROL	+6V(±0.5V) to -12V(±2V)
H	DOSE RATE CONTROL	-6V(±0.5V) to +12V(±2V)
J	T.V. CCU READY	See Chart A-4
K	PREP. REQUEST	0V to +15V (±10%)
M	SMALL MEAS. FIELD	0V to +15V (±10%)
N	REQ. STAND FLUOR.	0V to +15V (±10%)
P	MAIN PHASE	$5V_{tt}$ ±1V
R	MAIN PHASE	+6.4V ±2%
S	-15V	-15V ±2%
T	+15V	+15V ±2%
U	EVEN LINE	0V to +15V (±10%)
V	+6.4V	+6.4V ±2%
W	0V	0V ±2%
X	0V	0V ±2%

4.2. INPUT/OUTPUT SPECIFICATIONS (Cont.)

Adaptation Board BV25 WN23

INPUTS

Supply Voltage	+15V ±2%	-15V ±2%	5tt ±1V
Measuring Points	X1:2	X1:3	X1:18

Command Voltage	PREP. REQ.	STAND FLUOR. REQ.	EVEN LINE	H.SCAN REVERSE
Measuring Points All OV to +15V (±10%)	X1:9	X1:16	X1:10	X1:12

OUTPUTS

Command Voltage	Id MEASURING	CLEAN CIRCLE	EVEN LINE	H-SCAN REVERSE	V-SCAN INVERSE
Measuring Points All OV to +15V (±1V)	X1:9	X1:6	X1:8	X1:17	X1:5

Fixed Gain	OV to 5V ±100 mV	Dose Rate Control Adjust Voltage	OV to $10V^{+0.9V}_{-0V}$
Measuring Points	X1:4	Measuring Point	X1:7

Camera Control Board WN11

INPUTS

Supply Voltages	+15V ± 2%	+6.4V ± 2%	OV ± 2%	-15V ± 2%
Measuring Points	X1:2, X2:2	X1:4	X1:1; X1:22; X2:1; X2:22	X2:3; X1:3

Input Waveforms	Sample Pulse	V-Parabola	H-Parabola
Measuring Points	X1:16	X2:20	X2:16

* See Chart A-1

Fail Position OV or ± 15V ± 1V LED active at +15V

Measuring Point X2:21

T.V. Key Input 0 Ω

Measuring Point X1:21

COMMANDS

H-Scan Reversal OV to +15V ± 10%

Measuring Point X1:6

V-Scan Inverse OV to +15V ± 10%

Measuring Point X1:13

Target Negative Protection OV to +15V ± 10%

Measuring Point X1:17

Camera Control Board WN11 (Cont.)

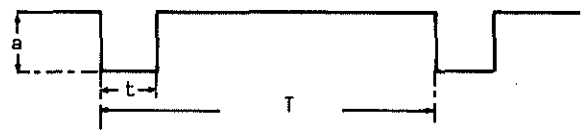
OUTPUTS

H-Shift	-9.5V ± 0.7V to +9.3V ± 1V
Measuring Point	X1:10
H-Scan Reverse/ V-Sync	0V to +15V (± 1V)
Measuring Point	X1:2
V-Shift	0V to +10V ± 0.7V
Measuring Point	X1:18
Vg Adjust	0V to -10.0V ± 0.7V
Measuring Point	X1:20
V-Amplitude	0V to -10.2V ± 0.7V
Measuring Point	X1:15
Target Negative Prevention	0V to $-5V^{-0.5V}_{+0.4V}$
Measuring Point	X2:5
Dynamic Focus	0V to 6V ± 1V
Measuring Point	X2:18
H-Amplitude	0.9 mA to 150-185 mA
Measuring Point	X2:11
Static Focus	81-94 mA to 148-179 mA
Measuring Point	X2:14
Alignment I and II	$-9V^{+0}_{-1.9V}$ to $8.5^{+2.2V}_{-0}$
Measuring Point	X2:9; X2:17
Target Voltage	0V to +6.2V ± 0.4V
Measuring Point	X2:19

CHART A-1

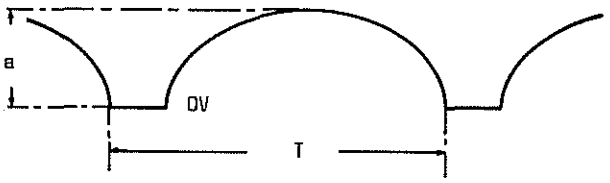
CAMERA CONTROL BOARD WN11 WAVEFORMS

SAMPLE PULSE



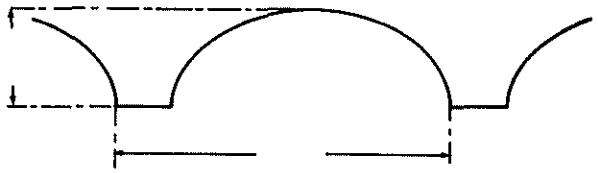
a = 0⟷+6.4V (+2%-30%)
t = 0.5 msec
T = 20 msec

V-PARABOLA



a = 0 to 5V ± 1V
T= frame frequency

H-PARABOLA



a = 0 to 6V ± 1V
T = Line frequency

NOTE

Dynamic Focus is a combination signal of the V-Parabola and the H-Parabola.

Video Processing Board WN13

INPUTS

Supply Voltages	+15V ± 2%	0V ± 2%	-15V ± 2%
Measuring Points	X2:2; X1:2	X1:22; X1:1; X2:22; X2:1	X1:3; X2:3

Input Waveforms	Dark Current Pulse	Composite Blanking Pulse	Circle Blanking	Composite Sync	See Chart A-2
Measuring Points	X2:20	X2:19	X2:18	X1:20	

Input Waveforms	Clamp Pulse	Sample Pulse	Video from Camera	See Chart A-2
Measuring Points	X1:17	X1:18	X3:1	

Video Processing board WN13 (Cont.)

INPUTS (Cont.)

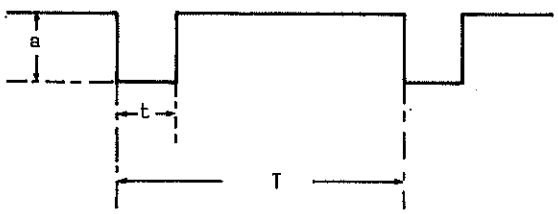
Clean Circle	OV to +15V (± 10%)	Active when low
Measuring Point	X1:6	
Dark Current Voltage	OV to +4V (-0% ± 5%)	
Measuring Point	X2:11	
Automatic Gain Voltage	OV to 4V (-0% + 5%)	
Measuring Point	X2:9	
Fail Position	OV or +15V ± 1V	LED active at +15V
Measuring Point	X2:6	
T.V. Key Input	0 Ω	Key 1 and 3
Measuring Point	X1:13	

OUTPUTS

Video Outputs	Video for kV	Video for Measure	VBS
Measuring Points	X2:14	X1:12	X4:1

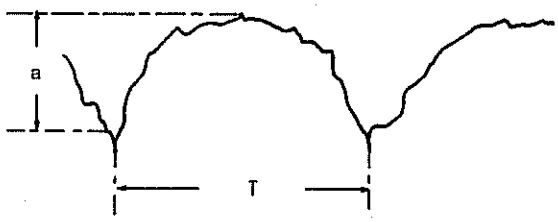
See Chart A-2

SAMPLE PULSE



a = OV to +6.4V (± 2%)
t = 240 µsec (50 Hz)
288 µsec (60 Hz)

VIDEO FROM CAMERA

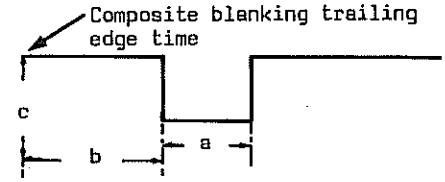


a = OV to 1200 mV
T = line frequency

CHART A-2

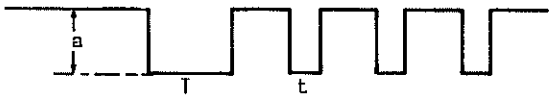
VIDEO PROCESSING BOARD WN13 WAVEFORMS

DARK CURRENT PULSE



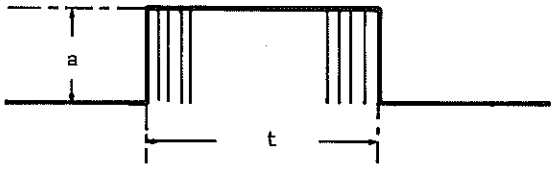
a = 1.2 µsec
b = 4.8 µsec
c = OV to 6.4 V (± 2%)

COMPOSITE BLANKING PULSE



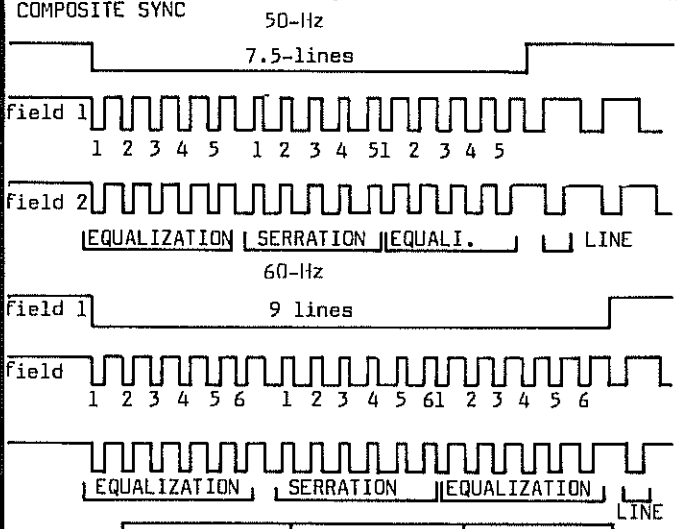
a = OV to 5 V
T = 1.6 msec (50 Hz); 1.35 msec (60 Hz)
t = 11.9 µsec (50 Hz); 11.1 µsec (60 Hz)

CIRCLE BLANKING



a = OV to +6.4V (± 2%)
t = 0 to 24.7 µsec

COMPOSITE SYNC



	EQUALIZATION	SERRATION	LINE
50 Hz	2.2 µsec	4.6 µsec	4.6 µsec
60 Hz	1.55 µsec	3.3 µsec	4.6 µsec

Amplitude OV to +6.4V (+6.4V (±2%)

CHART A-2 (Cont.)

VIDEO PROCESSING BOARD WN13 WAVEFORMS

VIDEO FOR kV CONTROL

a = 0V to 1200 mV; dc -9V ± 2V
T = line frequency See Chart A-7

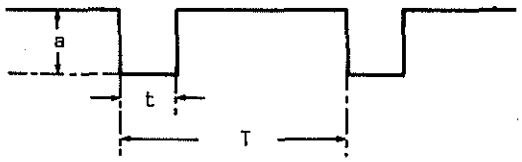
VIDEO FOR MEASURING

See Chart A-3

VIDEO, BLANKING, SYNC (VBS)

See Performance Data.

CLAMP PULSE



a = 0V to
t = 1.25 µsec
T = line frequent

AGC/Id Board WN17

INPUTS

Supply Voltages	+15V ± 2%	+6.4V ± 2%	0V ± 2%	-15V ± 2%
Measuring Points	X1:2	X1:3	X1:1; X1:22 X2:1; X2:22	X1:4

Input Waveforms	Modulated H-Parabola	Clamp Pulse	Composite Blanking	Discharge Pulse	See Chart A-3
Measuring Points	X2:16	X1:17	X2:19	X1:19	

Input Waveforms	Dark Current Reset Pulse	Dark Current + Power ON	Sample Pulse	See Chart A-3
Measuring Points	X2:20	X2:17	X1:18	

Input Waveforms	Video for Measuring	See Chart A-3	Automatic Gain Fast Lock-In	0V to +15V (± 10%)	
Measuring Point	X1:12		Measuring Point	X2:8	Active when low
Measuring Field External	0V to 6.4V (+2%-3%)	Active when low	Select Field Gain	0V to +15V (± 10%)	Active when low
Measuring Point	X1:8		Measuring Point	X2:13	
Fixed Gain	0V to 4V (-0 +10%)		Automatic Gain Lock-In	0V to +15V (±10%)	Active when low
Measuring Point	X2:5		Measuring Point	X1:6	
Measuring Field Select External	0V to +15V (± 10%7	Active when low	Fail Position	0V or +15V ± 1V	LED active at +15V
Measuring Point	X1:5		Measuring Point	X2:10	
Small Measuring Field	0V to +15V (± 10%)	Active when low	T.V. Key Input	0 Ω	Keys 3 and 4
Measuring Point	X1:7		Measuring Point	X1:13	

OUTPUTS

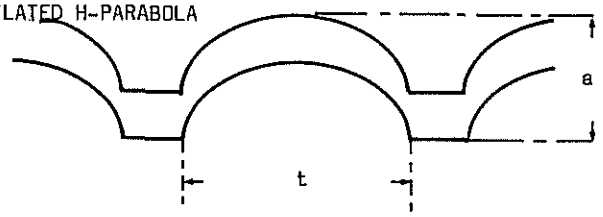
Automatic Gain Voltage	0V to 4V (-0% + 5%)	Dark Current Voltage	0V to 4V (-0% +5%)
Measuring Point	X2:9	Measuring Point	X2:11

Output Waveforms	Circle Blanking	Measuring Field for kV	See Chart A-3
Measuring Points	X2:18	X1:11	

CHART A-3

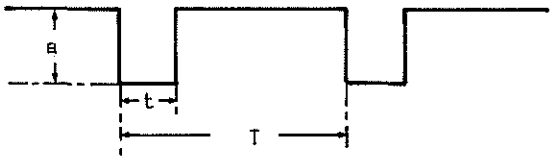
AGC/Id BOARD WAVEFORMS

MODULATED H-PARABOLA



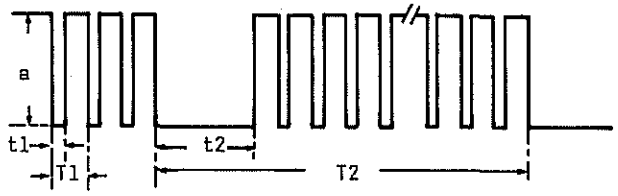
a = 0V to 6V ± 1V
t = 52.2 µsec (50-Hz); 52.5 µsec (60-Hz)

CLAMP PULSE



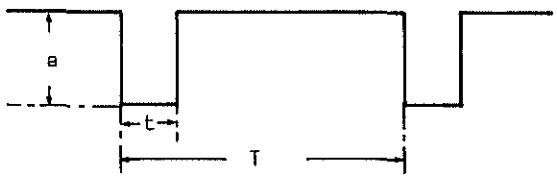
a = 0V to +6.4V (+2%-30%)
t = 1.25 µsec ± 0.25 µsec Active when low
T = 64 µsec (50 Hz); 63.6 µsec (60 Hz)

COMPOSITE BLANKING



a = 0V to +6.4V (2%-30%)
t1 = 11.9 µsec (50 Hz); 6.36 µsec (60Hz) Active when low
T1 = 6.4 µsec (50 Hz); 6.36 µsec (60 Hz)
t2 = 1.6 msec (50 Hz); 1.35 msec (60 Hz)
T2 = 20 msec (50 Hz); 16.66 msec (60 Hz)

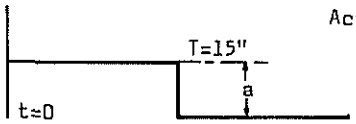
DISCHARGE PULSE



a = 0V to +6.4V (+2%-30%)
t = 0.5 msec Active when low
T = 20 msec

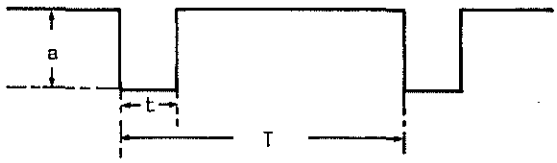
DARK CURRENT RESET PULSE

Active when low



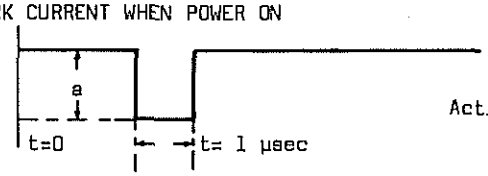
a = 0V to +6.4V (+2%-30%)

SAMPLE PULSE



a = 0V to +6.4V (+2%-30%)
t = 0.5 msec
T = 20 msec

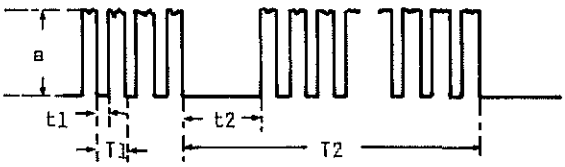
DARK CURRENT WHEN POWER ON



Active when low

a = 0V to +6.4V (+2%-30%)

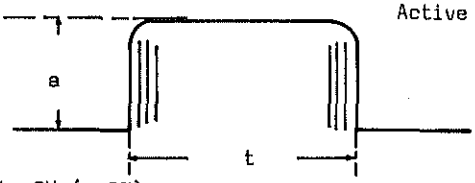
VIDEO FOR MEASURING



a = 0.1V to 1V (+10%)
t1 = 11.9 µsec (50 Hz); 11.1 µsec (60 Hz)
T1 = 6.4 µsec (50 Hz); 63.6 µsec (60 Hz)
t2 = 1.6 msec (50 Hz); 1.3 msec (60 Hz)
T2 = 20 msec (50 Hz); 16.66 msec (60 Hz)

CIRCLE BLANKING

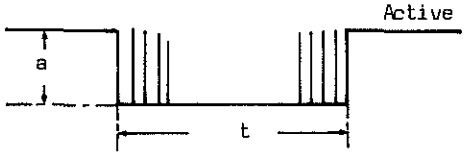
Active when low



a = 0V to 5V (± 5%)
t = Between 0 µsec and 20 µsec

MEASURING FIELD FOR kV

Active when low.



a = 0V to 5V (± 5%)
t = Between 0 µsec and 20 µsec

Pulse Generator Board WN19

INPUTS

Supply Voltages	+15V ± 2%	+6.4V ± 2%	0V ±	-15V ± 2%	2VAC, 50 or 60 Hz
Measuring Points	X1:2	X1:4	X1:1; X1:22 X2:1; X2:22	X1:3	X1:8

Even Line Command	+15V or 0V	Active when	Mains Lock Command	+15V or 0V	Active when
Measuring Points	X2:12	low	Measuring Point	X2:8	low

Fail Position	0V or +15V	LED active
Measuring Point	X2:7	at +15V

OUTPUTS

Output Waveforms	Clamp Pulse	Dark Current Pulse	H-Blanking	V-Blanking Pulse	Sample Pulse
Measuring Points	X2:14	X1:18	X2:9	X2:11	X2:4

See chart A-4

Output Waveforms	Discharge Pulse	Composite Blanking	Composite Sync	Combi-Pulse	Sync Output
Measuring Points	X2:14	X1:18	X2:9	X2:11	X2:4

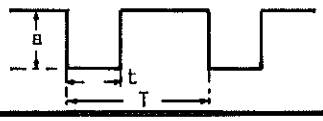
See chart A-4

Output Waveforms	Dark Current Power ON	Dark Current Reset	T.V. Ready Signal	See Chart
Measuring Points	X2:19	X2:16	X2:18	A-4

CHART A-4

PULSE GENERATOR BOARD WN19 WAVEFORMS

CLAMP PULSE

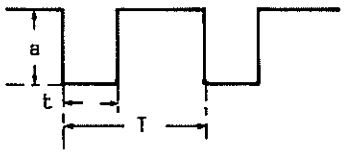


a = 0V to +6.4V
t = 1.25 µsec
T = 64 µsec (50 Hz)
63.6 µsec (60 Hz)

DARK CURRENT PULSE

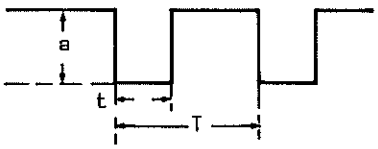
a = 0V to +6.4V
t = 2.8 µsec
T = 64 µsec (50 Hz)
63.6 µsec (60 Hz)

H-BLANKING PULSE



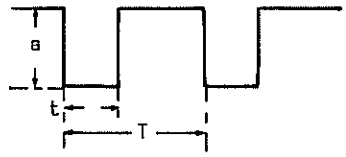
a = 0V to +6.4V
t = 11.1 µsec (60 Hz)
11.9 µsec (50 Hz)
T = 63.6 µsec (60 Hz)
64 µsec (50 Hz)

V-BLANKING PULSE



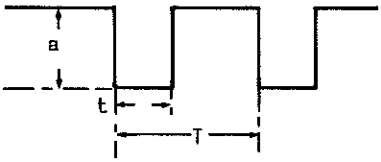
a = 0V to +6.4V
t = 1.6 msec (50 Hz)
1.35 msec (60 Hz)
T = 20 ms (50 Hz)
16.6 msec (60 Hz)

SAMPLE PULSE



a = 0V to +6.4V
t = 480 µsec (50 Hz)
572.4 µsec (60 Hz)
T = 20 msec (50 Hz)
16.6 msec (60 Hz)

DISCHARGE PULSE



a = 0V to +6.4V
t = 256 µsec
T = 20 msec (50 Hz)
16.6 msec (60 Hz)

COMPOSITE BLANKING

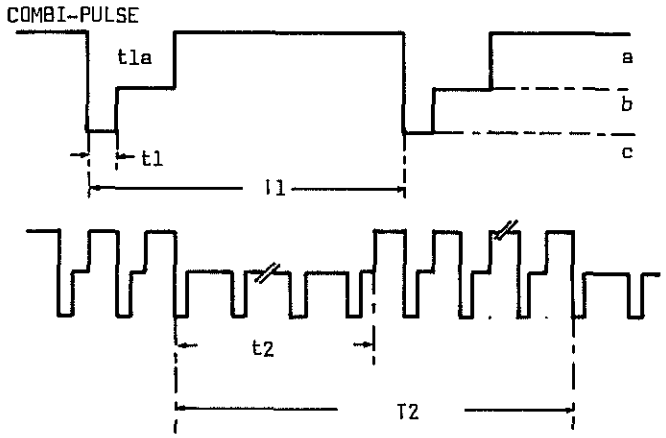
See Chart A-3.

COMPOSITE SYNC

See Chart A-2

CHART A-4 (Cont.)

COMBI-PULSE

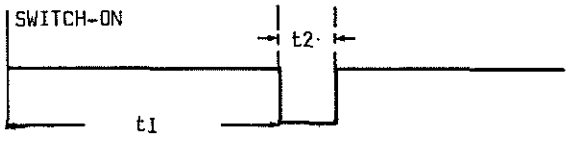


a = +5.5V ±0.2V
b = +2V ±0.2V
c = -0.7V ± 0.2V
t1 = 7.1 µsec (50 Hz); 6.35 µsec (60 Hz)
tla= 11.9 µsec (50 Hz); 11.1 µsec (60 Hz)
T1 = 64 µsec
t2 = 1.6 msec (50 Hz); 1.35 msec (60 Hz)
T2 = 20 msec (60 Hz)
16.6 msec (60 Hz)

SYNC OUTPUT

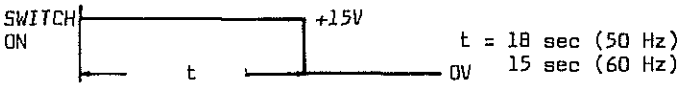
Same signal as the composite sync (see Chart A-2) at a level of 2V across 75 Ω (± 0.25V)

DARK CURRENT WITH POWER ON



t1 = 16.6 sec (50 Hz); 13.9 sec (60 Hz)
t2 = 1.3 sec (50 Hz); 1.06 sec (60 Hz)

DARK CURRENT RESET



T.V. READY SIGNAL

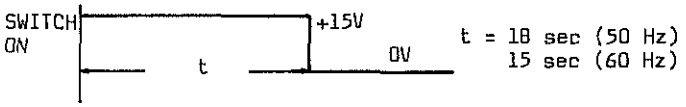


CHART A-5

PULSE GENERATOR BOARD TIMING DIAGRAMS

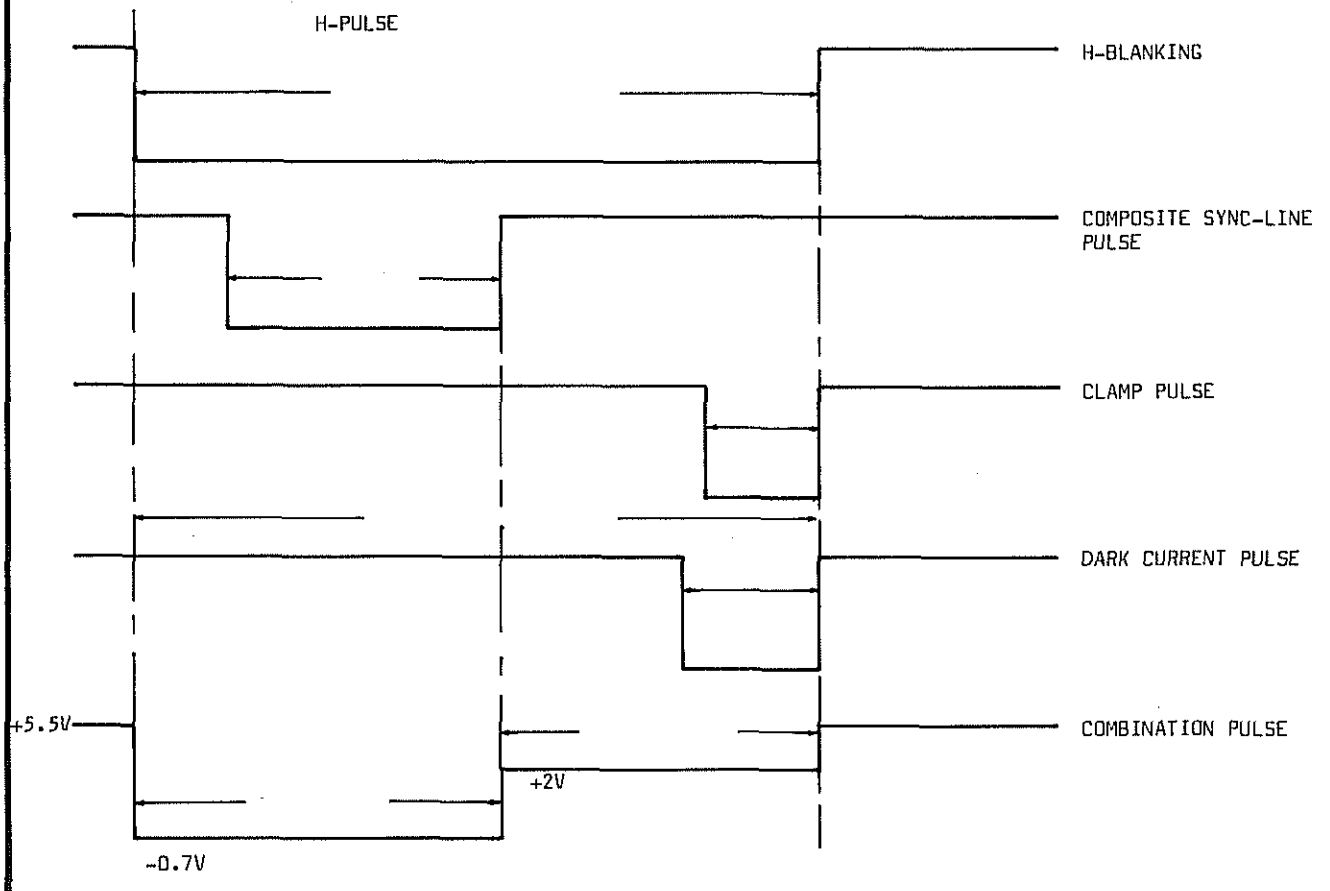
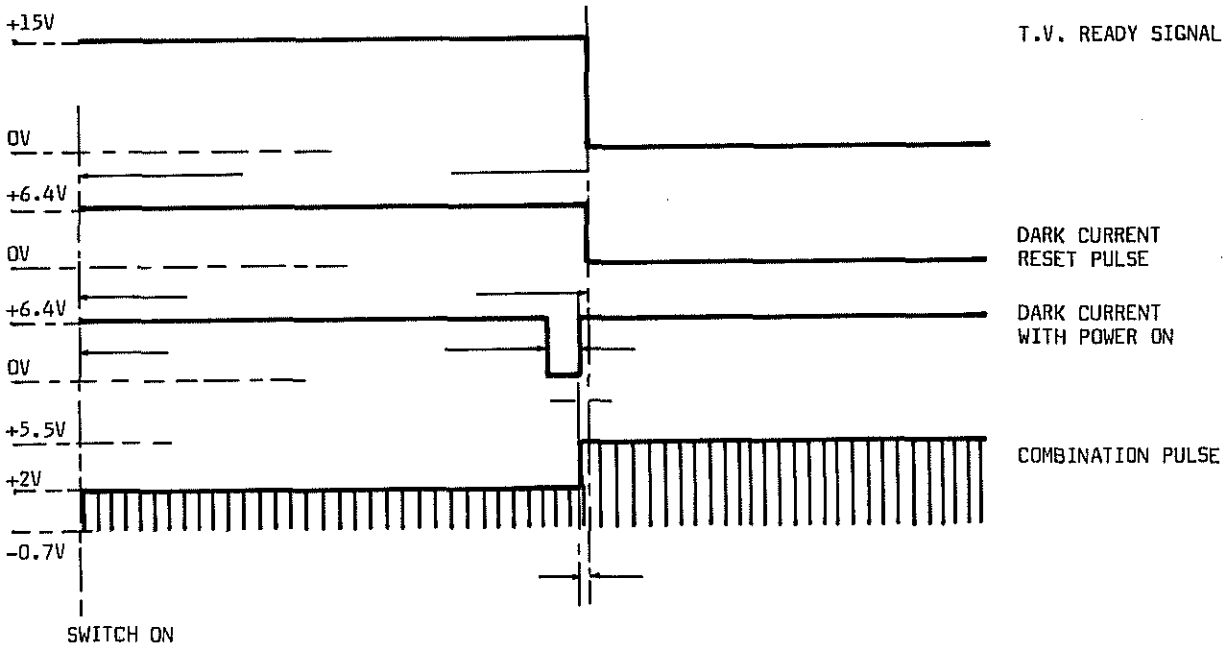
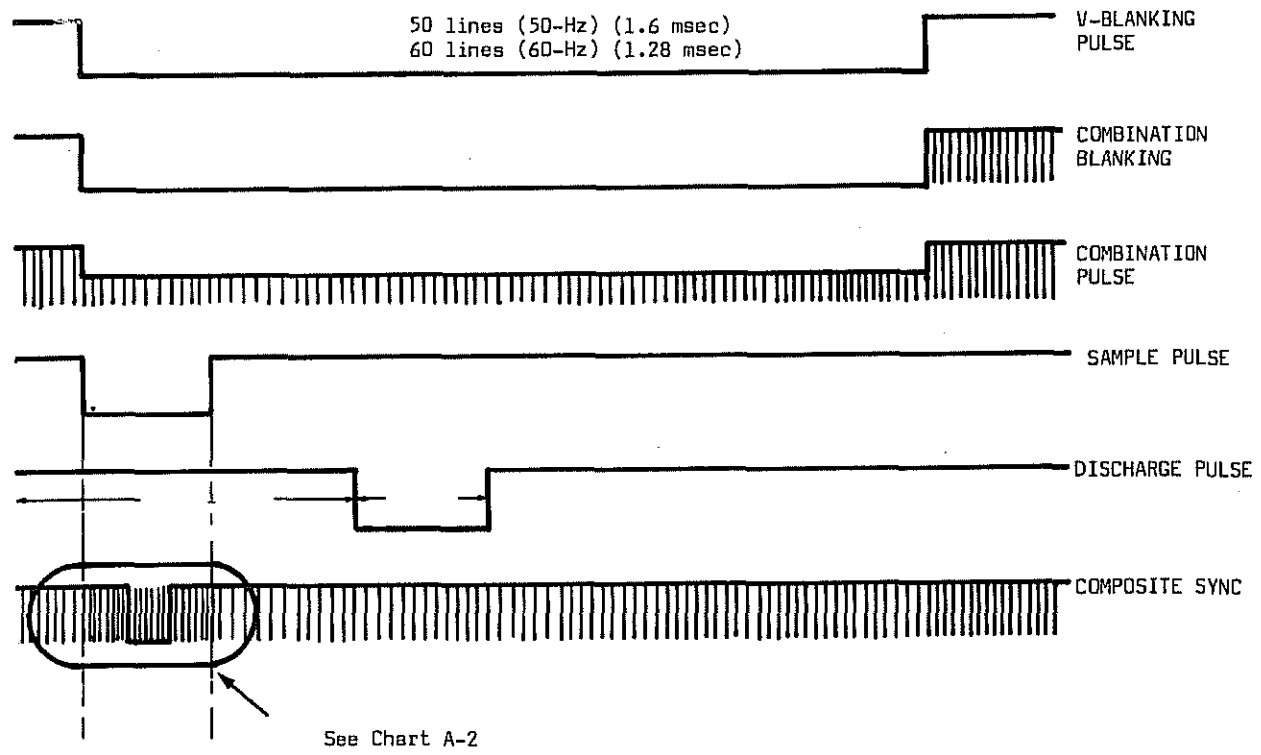


CHART A-5 (Cont.)

START PULSES



COMBINATION PULSES



Monitoring Board WN21

INPUTS

Supply Voltages	+15V ± 2%	+6.4V ± 2%	0V ± 2%	+15V ± 2%
Measuring Points	X1:2	X1:4	X1:1, X1:22	X1:9

Input Waveforms	H-Blanking Pulse	V-Blanking Pulse	See Chart
Measuring Points	X1:6	X1:14	A-4

Fail Position — 0V or +15V ± 1V — LED active at +15V — Measuring Point X1:20

T.V. Key Input — 0 Ω — Measuring Point X1:7 — Keys 5 an 6

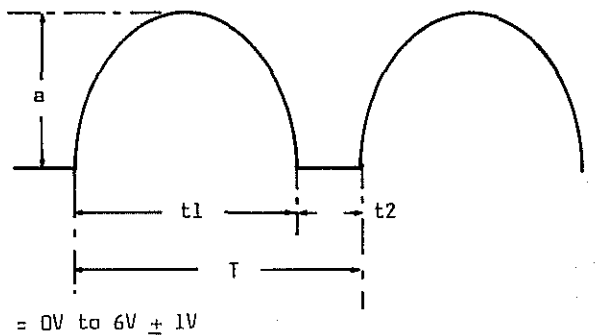
OUTPUTS

Output Waveforms	H-Parebola	V-Parabola	Modulated H-Parabola	See Chart
Measuring Points	X1:16	X1:18	X1:10	A-6

CHART A-6

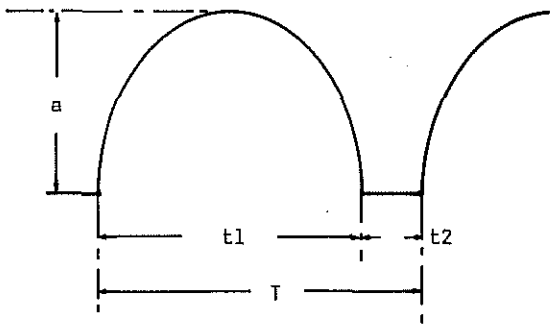
MONITORING BOARD WN21 OUTPUT WAVEFORMS

H-PARABOLA



a = 0V to 6V ± 1V
t1 = 52.2 µsec (50 Hz); 52.5 µsec (60 Hz)
t2 = 11.9 µsec (50 Hz); 11.1 µsec (60 Hz)
T = 64 µsec (50 Hz); 63.6 µsec (60 Hz)

V-PARABOLA



a = 0V to 6V ± 1V
t1 = 18.4 msec (50 Hz); 15.3 msec (60 Hz)
t2 = 1.6 msec (50 Hz); 1.35 msec (60 Hz)
T = 20 msec (50 Hz); 16.6 msec (60 Hz)

MODULATED H-PARABOLA

See Chart A-3.

kV Control Board WN22

INPUTS

Supply Voltages	+15V ± 2%	+6.4V ± 2%	0V ± 2%	-15V ± 2%
Measuring Points	X1:2	X1:4	X1:1, X1:22	X1:3

Input Waveforms	Video for kV	Sample Pulse	Clamp Pulse	Discharge Pulse	Measuring Pulse	See Chart A-7
Measuring Points	X1:14	X1:10	X1:12	X1:16	X1:18	

Failure Position — 0V or +15V ± 1V — LED active at +15V — Measuring Point X1:21

Dose Rate Fluoroscopic Control — 0V to 10V — Measuring Point X1:9

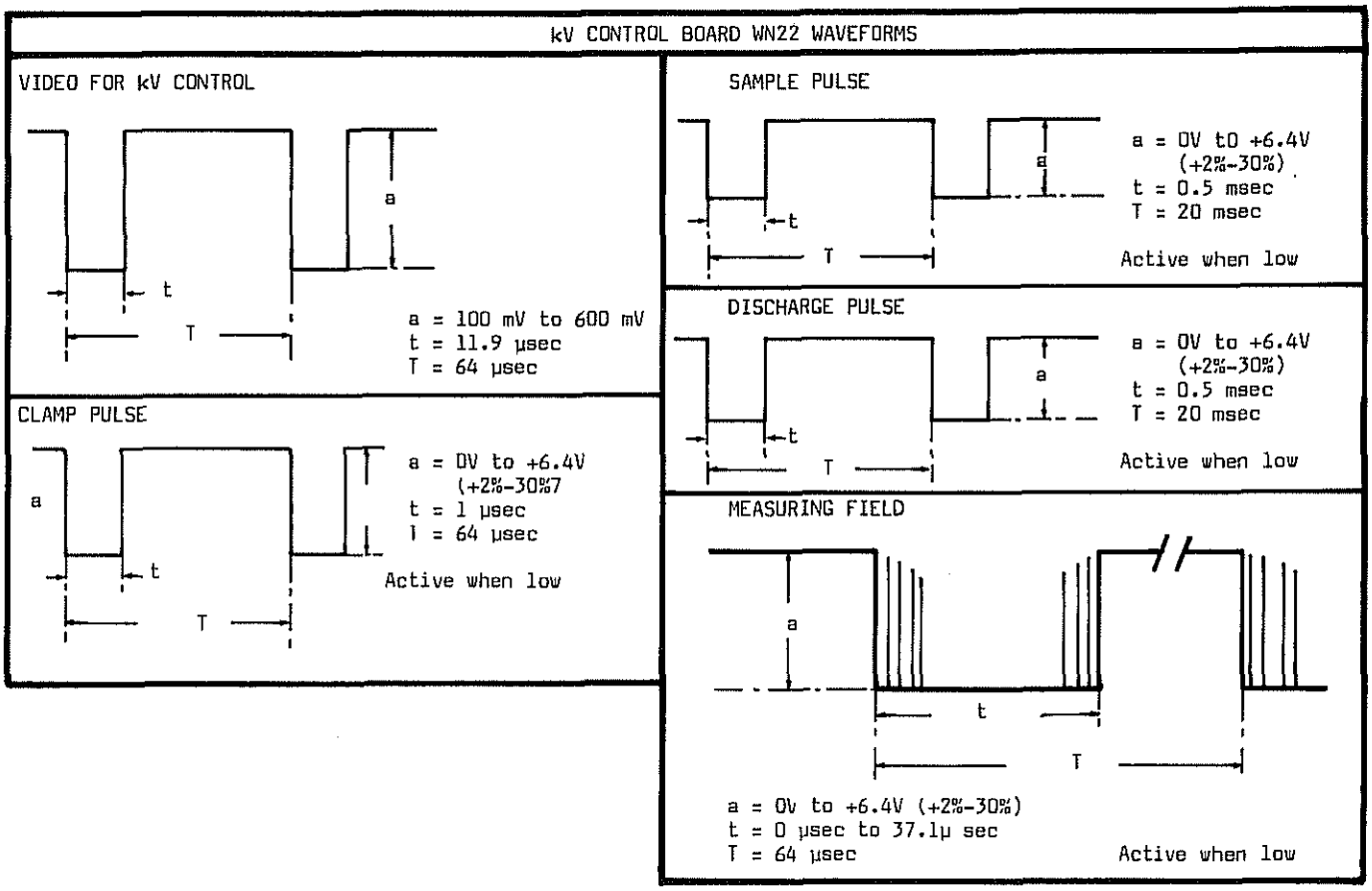
T.V. Key Input — 0 Ω — Keys 6 and 7 — Measuring Point X1:1

OUTPUTS

	POSITIVE	NEGATIVE
Dose Rate Control Voltage	-6V (± 0.5V) to +12V (± 2V)	+6V (± 0.5V) to -12V (± 2V)
Measuring Points	X1:6	X1:8

kV Control Board WN22 (Cont.)

CHART A-7



4.3. DIMENSIONS AND WEIGHTS

See Figure AZ-5 for the dimensions and weights of the XTV5 Camera Control Unit FB.

4.4. MOUNTING INSTRUCTIONS

See Section B, INSTALLATION, for furhter information on the mounting arrangement possibilities.

4.5. SUPPLY REQUIREMENTS

See paragraph 4.1., PERFORMANCE DATA, for supply requirements.

4.6. ENVIRONMENTAL DATA

Ambient temperature ?
Humidity ?

4.7. TRANSPORT AND HANDLING

There are no special transport or handling instructions.

4.8. IEC CLASSIFICATION

4.9. APPLICABLE STANDARDS

Section B: INSTALLATION

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3. PURPOSE OF MOUNTING MATERIAL B-1

4. INSTALLATION OF INSTRUCTIONS B-1

4.1. INITIAL CONDITIONS B-1

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5.2.2. Rectangular/Circular Blanking Selection B-2
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1. INTRODUCTION

This section contains instructions for installation and for programming the XTV5 Camera Control Unit FB.

2. TOOLS AND TEST EQUIPMENT

A standard tool set is required to install the XTV5 Camera Control Unit HFB.

3. PURPOSE OF MOUNTING MATERIAL

The purpose of the mounting material supplied with the XTV5 Camera Control Unit FB is to secure the unit.

4. INSTALLATION INSTRUCTIONS

4.1. INITIAL CONDITIONS

(1) Before installing the XTV5 Camera Control Unit HFB, check that the programming requirements have been fulfilled in accordance with paragraph 5, PROGRAMMING FACILITIES, of this section.

(2) Visually check the wiring for loose of faulty connections. Repair if necessary.

4.2. INSTALLATION IN BV25

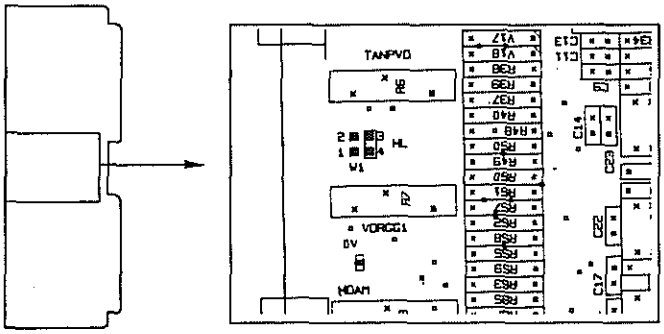
See the group level documentation for the BV25 for installation instructions.

5. PROGRAMMING FACILITIES

This paragraph describes the conditions which must be met before installing the XTV5 Camera Control Unit HFB. Positions of the controls and adjustments are described in Section C, SETTING TO WORK.

5.1. CAMERA CONTROL BOARD WN11

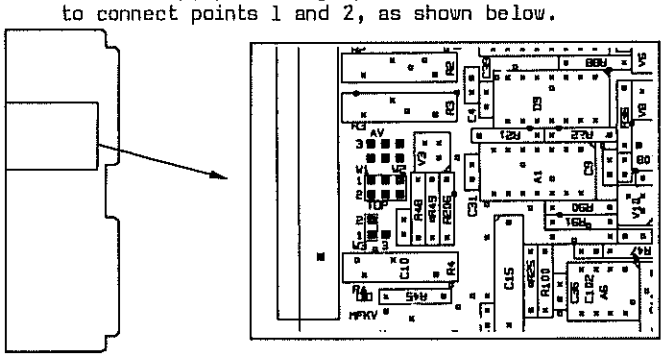
(1) Position jumper switch W1 to connect points 3 and 4 as shown below.



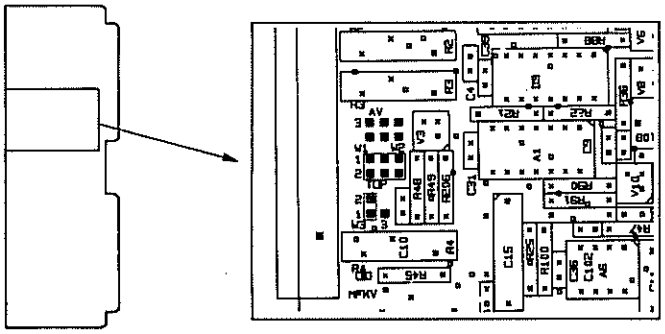
5.2. AGC/Id BOARD WN17

5.2.1. AGC Top/Average Selection

(1) For AGC Top, position jumper switches W1 and W2 to connect points 1 and 2, as shown below.

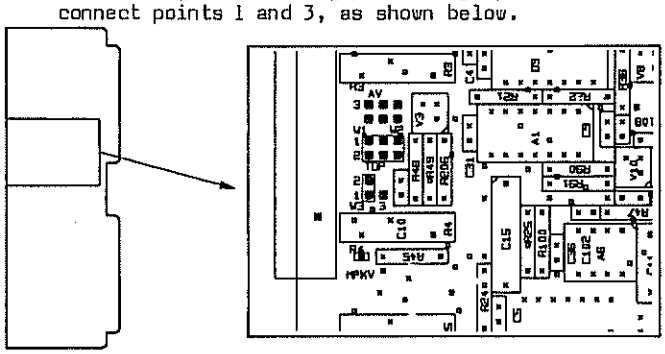


(2) For AGC Average, position jumper switches W1 and W2 to connect points 1 and 3, as shown below.

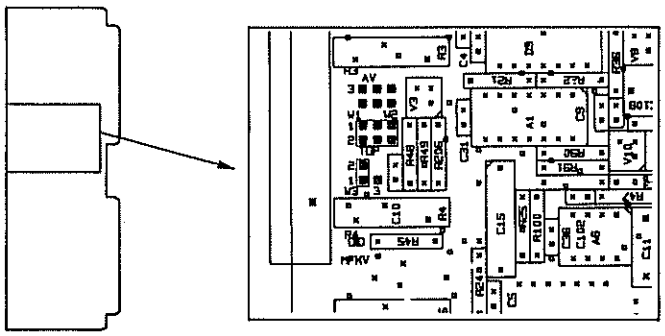


5.2.2. Rectangular/Circular Blanking Selection

(1) For rectangular blanking position jumper W3 to connect points 1 and 3, as shown below.



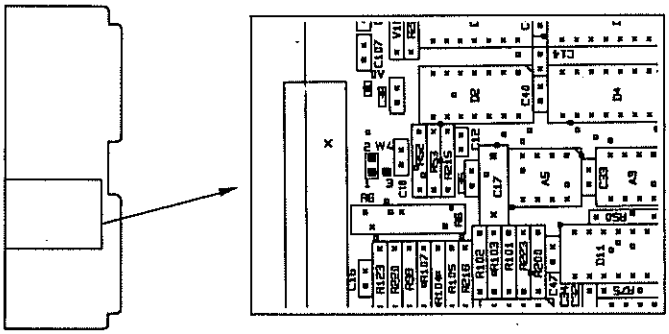
(2) For Circular blanking, position jumper W3 to connect points 1 and 2 as shown below.



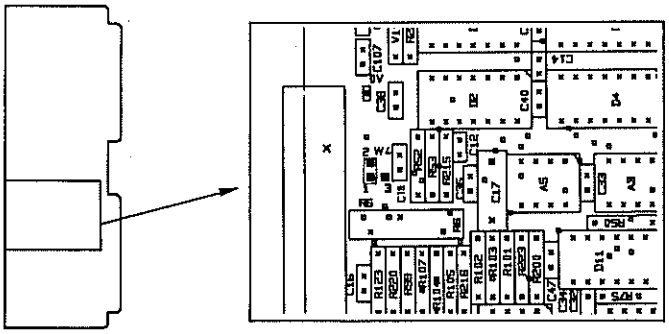
5.2. AGC/Id BOARD WN17 (Cont.)

5.2.3. Manual/Automatic Dark Current Control Selection

(1) For automatic dark current compensation control, position jumper switch W4 to connect points 1 and 2 as shown below.



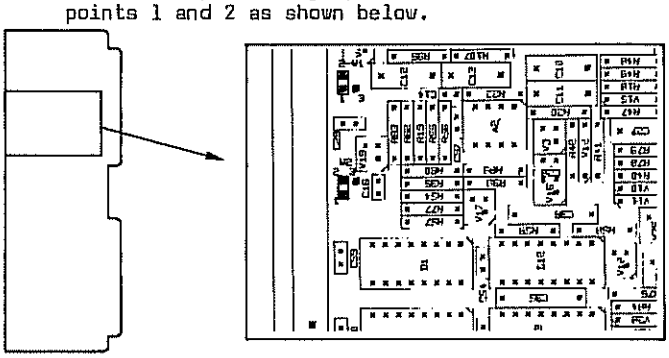
(2) For manual dark current compensation control, position jumper switch W4 to connect points 1 and 3 as shown below.



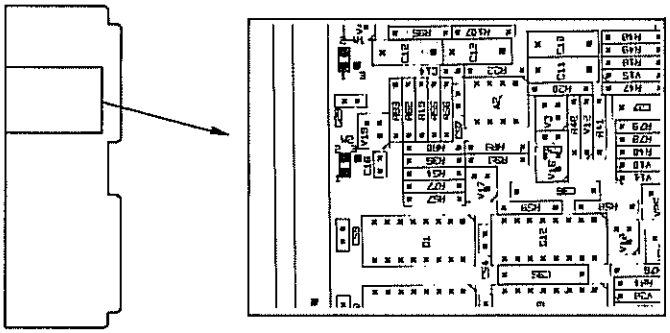
5.3. PULSE GENERATOR BOARD WN19

5.3.1. 50 Hz/60 Hz Selection

(1) For 50 Hz, position jumper switch W2 to connect points 1 and 2 as shown below.



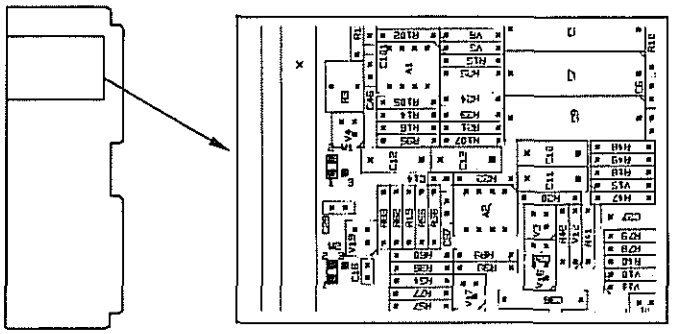
(2) For 60 Hz, position jumper switch W2 to connect points 1 and 3 as shown below.



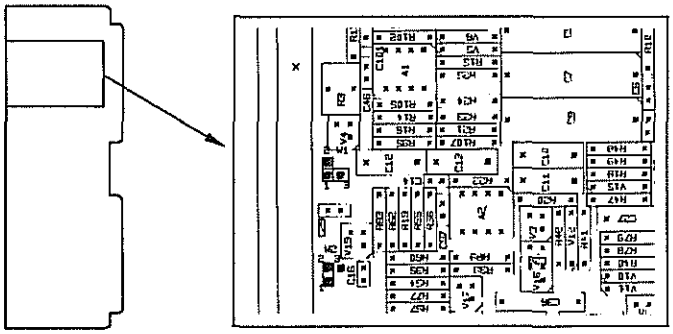
5.3. PULSE GENERATOR BOARD WN19 (Cont.)

5.3.2. Mains/Crystal Oscillator Selection

(1) For Mains Oscillator, position jumper switch W4 to connect points 1 and 2 as shown below.

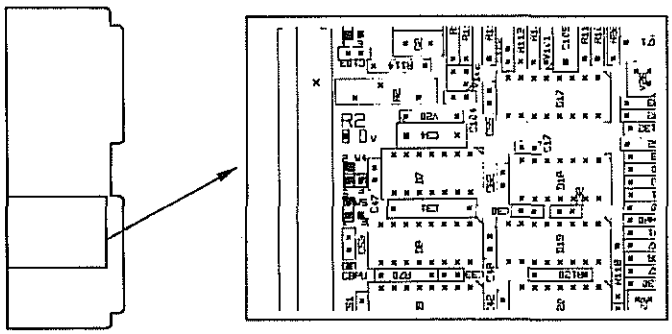


(2) For Crystal Oscillator, position jumper switch W4 to connect points 1 and 3 as shown below.



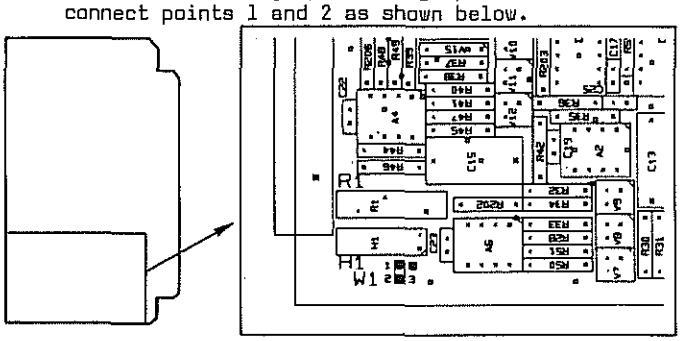
5.3.3. Even Line Selection

Position jumper switch W5 to connect points 1 and 3 as shown below.

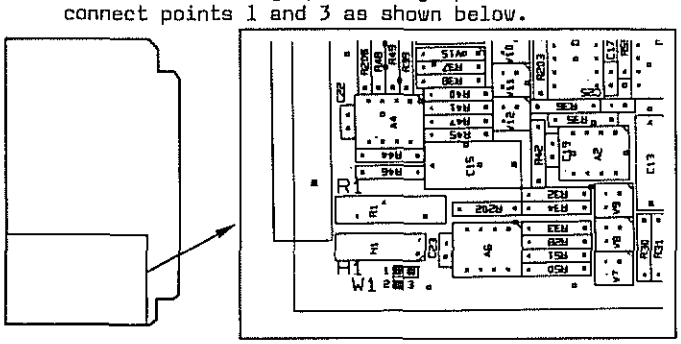


5.4. MONITORING BOARD WN21

(1) For 3 x 4 scanning, position jumper switch W1 to connect points 1 and 2 as shown below.



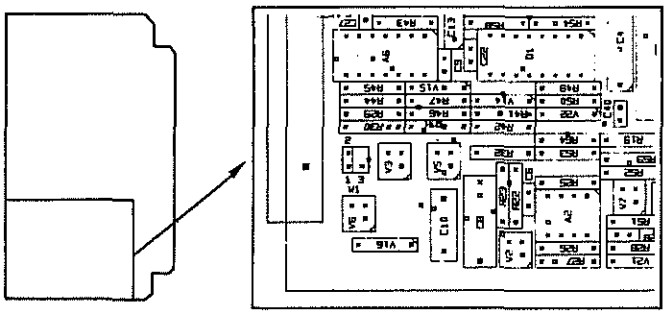
(2) For 1 x 1 scanning, position jumper switch W1 to connect points 1 and 3 as shown below.



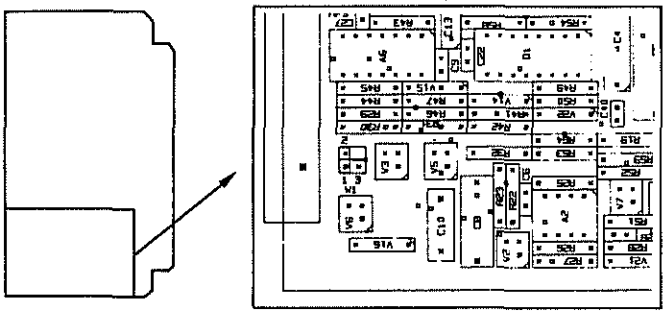
5.5. kV CONTROL BOARD WN22

5.5.1. Top/Average kV Control Selection

(1) For Top level kV Control, position jumper switch W1 to connect points 1 and 2 as shown below.

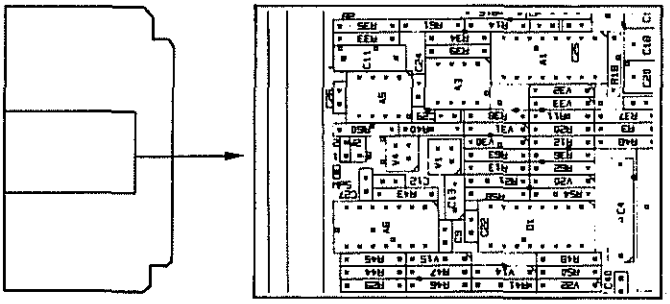


(2) For Average kV Control, position jumper switch W1 to connect points 1 and 3 as shown below.

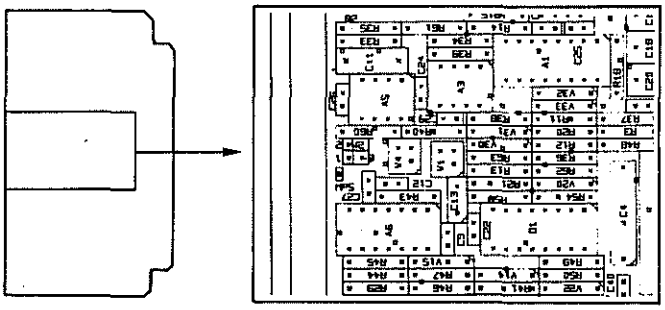


5.5.2. kV/mA/mA Selection

(1) For kV/mA Control, position jumper switch W2 to connect points 1 and 2 as shown below.



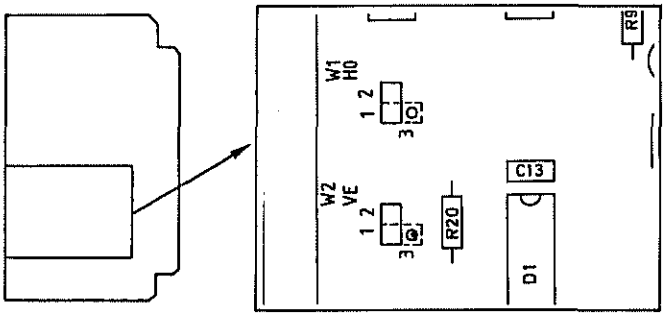
(2) For mA Control, position jumper switch W2 to connect points 1 and 3 as shown below.



5.6. ADAPTATION BOARD BV25

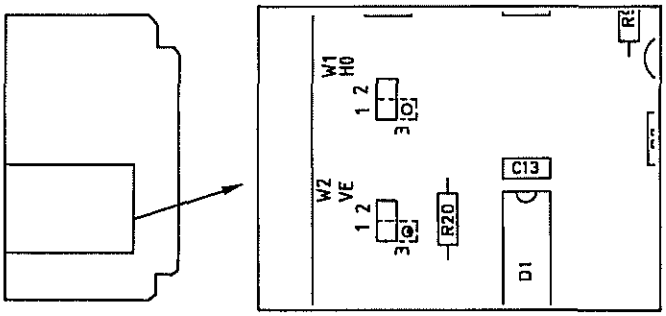
5.6.1. H-Scan Reverse Selection

For H-Scan Reverse, position jumper switch W1 to connect between points 1 and 3 as shown below.



5.6.2. V-Scan Inverse Selection

For V-Scan Inverse Selection, position jumper switch W2 to connect between points 1 and 3 as shown below.



Section C: SETTING TO WORK

CONTENTS

1. INTRODUTION C-1

2. EQUIPMENT REQUIRED C-1

3. SETTING UP AND TESTING C-1

4. CONTROLS AND ADJUSTMENTS C-1

5. TEST POINTS C-1

6. INDICATIONS C-1

LIST OF TABLES

C-1 CONTROLS AND ADJUSTMENTS

C-2 TEST POINTS

C-3 INDICATIONS

1. INTRODUCTION

This section describes the control, adjustment and test facilities for the XTV5 Camera Control Unit FB.

Instructions for SETTING TO WORK may be found in the group level documentation.

2. EQUIPMENT REQUIRED

Multimeters	Oscilloscopes	
PM2411	PM3110	PM3226
PM2412/01/02	PM3210	PM3232
PM2412A	PM3231	PM3233
PM2503	PM3200	PM3240
PM2517 x (preferred)	PM3225	
or equivalent	or equivalent	

3. SETTING UP AND TESTING

Step-by-step procedures for setting-up and testing the XTV5 Camera Control Unit FB may be found in the group level documentation.

4. CONTROLS AND ADJUSTMENTS

The controls and adjustments for the XTV5 Camera Control Unit HFB are listed in Table C-1.

5. TEST POINTS

The test points for the XTV5 Camera Control Unit HFB are listed in Table C-2.

6. INDICATIONS

Indication lamps are listed in Table C-3.

TABLE C-1

CONTROLS AND ADJUSTMENTS

LOCATION	NAME	FUNCTION
ADAPTATION BOARD BV25 WN23	DOSE RATE CONTROL VOLTAGE ADJUST (R1)	Adjust dose rate control voltage to kV control Board. max. CCW-0V ± 10mV; CW 10.0V to 10.9V at (X1:7).
	FIXED GAIN ADJUST (R2)	Adjust fixed gain voltage. max. CCW 0V ± 10V; CW 5V ± 400 mV (X1:4).
	W1 JUMPER	Allows selection of H-Scan Reverse (1 to 2 NORMAL) (1 to 3 REVERSE)
	W2 JUMPER	Allows selection of V-Scan Inverse (1 to 2 NORMAL) (1 to 3 INVERSE)
CAMERA CONTROL BOARD WN11	H-SHIFT REVERSED (R1)	Adjusts the position of scanning pattern, left or right, at the target at camera. Adjustment required. *max. CCW - 9.3V ± 1V; max. CW -9.3V ± 0.7V (X1:10)*
	H-SHIFT NORMAL (R2)	Adjusts the position of scanning pattern, left or right, at the target at camera. max. CCW -9.3V ± 1V; max CW +10.2V ± 0.7V (X1:15)
	V-AMPLITUDE (R3)	Adjusts the height of the scanning pattern on the target at the camera. Adjustment required. max. CCW 0V ± 0.1V; max. CW +10.2V ± 0.7V (X1:15)
	V-SHIFT NORMAL (R4)	Adjusts the position of scanning pattern, up or down, at the target at camera. Adjustment required. max. CCW 0V ± 0.1V; max. CW +10V ± 0.7V (X1:18)
	V-SHIFT INVERSED (R5)	Adjusts the position of scanning pattern, up or down, at the target at camera. Adjustment required. max. CCW 0V ± 0.1V; max CW +10V ± 0.7V (X1:18)
	TARGET NEGATIVE PREVENTION (R6)	Adjusts safety protection voltage for camera. Adjustment required. max. CCW 0V ± 0.05V; max. CW -4.6V and -5.15V (X2:5)
	Vg ADJUST (R7)	Adjusts voltage applied to grid 1 at camera. Adjustment required. (X1:20) with (R6) and (R7) max. CCW = 0V ± 0.1V with (R6) adjusted to -4V and (R7) max. CCW = 0.4V ± 0.05V with (R6) and (r)) max. CW = -10V ± 0.7V
	H-AMPLITUDE (R8)	Adjusts the width of the scanning pattern at the target at the camera. Adjustment required. (X2:11) with W1 connecting 1 and 2 and (R8) mac. CCW = +1.07V to +1.47 V with W1 connecting 1 and 2 and (R8) max. CW = 0V with W1 connecting 3 and 4 and (R8) max. CCW =2.00V to 2.54V with W1 connecting 3 and 4 and (R8) max. CW = ?
	STATIC FOCUS (R9)	Adjusts the static focus voltage. Adjustment required. (X2.14) max. CCW = -2.2V to -4V; max. CW = -6.0 and -9V.
	ALIGNMENT 1 (R10)	Adjusts the voltage to the alignment coils. Adjustment required. (X2:9) max. CCW = -9V to -10.9V: max. CW = +8.5V to +10.7V.
	ALIGNMENT 2 (R11)	Adjusts the voltage to the alignment coils. Adjustment required. (X2:9) max. CCW = -9V to -10.9V: max. CW = +8.5V to +10.7V.
	TARGET VOLTAGE (R12)	Adjusts the voltage used for target voltage. Adjustment required (X2:19) max.CCW = 0V ± 0.1V; max. CW = ?
	LINE RATE ADJUST (W1)	Allows selection between High and Low Scanning Rates.
	CAMERA TUBE TYPE SELECT	Allows selection for diode gun type camera tubes. 1-2 other tubes; 3-4 (D1) Diode gun.

TABLE C-1 (Cont.)

LOCATION	NAME	FUNCTION
VIDEO PROCESSING BOARD WN13	CLEAN CIRCLE SET-UP (R3)	Adjusts the set-up during clean circle (X4:1) Set-up = 35 mV ± 10%.
	GAIN ADJUSTMENTS (R1) and (R2)	Adjusts the video gain. Factory pre-set. with 0V ± 10mV at X2:11 and 4V ± 10 mV at X2:9 and (R1) max. CCW; (R2) is adjusted to 6.6 ± 1.5% times The max. video of 100 mV With 0V ± 10 mV at X2:9 and max. video of 1000 mV, (R2) is adjusted to 0.59 ± 1.5% times max. video.
AGC/Id BOARD WN17	MEASURING FIELD ADJUST (R1), (R2), (R3)	Adjust the measuring field size. At measuring points 19 (R2) max. CCW = 3.2V to 3.8V, max CW = 8.2V to 8.6V With small measuring field selected: at measuring point 19, (R3) max CW = 9.2V to 7.6V. (R3) and (R2) max. CCW = 3.2V and 3.8V. With (R2) adjusted to 4V ± 100 mV at measuring point 19 when small measuring field not selected, and with (R3) adjusted to 5V ± 100 mV at measuring point 19 and with a voltage of 4.5V ± 100 mV applied to point X2:16; then turning (R1) should result in an increas and decrease in voltage at point X1:11.
	AGC THRESHOLD ADJUST (R4)	Adjusts the automatic gain control threshold, Factory pre-set. With 1V applied to pointX1:12 at point X2:9 (R4) max. CCW = 0V+100mV; max CW = 4V +0.6V -500mV -0V
	CIRCLE BLANKING ADJUST (R5)	Adjusts circle blanking time. Facotry pre-set. With (W3) connecting points 1 and 2 and X2:20 low and 4.5V applied to point X2:16: then (R5) max CCW result in a voltage of 5V at point X2:18.
	MANUAL Id ADJUST (R6)	Adjusts the dark current compensation when in manual-mode. With (W4) connecting points 1 and 2, at point X2:11; (R6) max. CW = 4.5V < V > 5.5V; max CCW = 0V ± 50 mV
	Id THRESHOLD ADJUST (R7)	Adjusts the dark current threshold voltage. At measuring point 18; (R7) max CCW = 0.5V to -0.6V; max CW = +0.5V to +0.6V
	W1 JUMPER W2 JUMPER	Allows selection for TOP/AVERAGE AGC. (1-2 for TOP) (1-3 for AVERAGE)
	W3 JUMPER	Allows selection for circular/rectangular blanking (1-2 for circular) (1-3 for rectangular)
	W4 JUMPER	Allows for selection of AUTO/MANUAL Id (1-2 for AUTO Id) (1-3 for MANUAL Id).
PULSE GENERATOR BOARD WN19	MAINS LOCK CONTROL ADJUST (R1)	Adjusts oscillator output. Factory pre-set. Adjusts line frequency and voltage.
	W1 JUMPER	Allows selection for int. and ext. synchronisation. (1-2 for int.) (1-3 for ext.)
	W2 JUMPER	Allows selection for 50/60 Hz (1-2 for 50 Hz) (1-3 for 60 Hz)
	W4 JUMPER	Allows selection for MAINS LOCK /XTAL LOCK (1-2 for mains lock) (1-3 for CRYSTAL)
	W5 JUMPER	Allows selection for interlaced or non interlaced scanning. (1-2 for interlaced) (1-3 for non interlaced).

TABLE C-1 (Cont.)

LOCATION	NAME	FUNCTION
MONITORING BOARD WN21	MODULATED H-PARABOLA ADJUST (R1)	Adjusts the raster amplitude. Factory pre-set. (R1) max. CCW = 2.10V, max CW = 2.3V
	W1 JUMPER	1-2 scanning 3/4 625/525 L 1-3 scanning 1/1 1249/1049 L
kV CONTROL BOARD WN22	VARIABLE GAIN AMPLIFIER ADJUST (R1) and (R2)	Adjust input voltages to variable gain amplifier. Factory pre-set. With 200 mV ± 10 mV at X1:4 and 0V at X1:9, (R1) is adjusted to +6.4V ± 0.1V at X1:6. With 1200 mV ± 10 mV at X1:14 and 10V ± 10mV at X1:9; (R1) is adjusted to +1-2V ± 0.1V at X1:6.
	W1 JUMPER	Allows selection for TOP/AVERAGE kV contral. (1-2 for TOP) (1-3) for AVERAGE)
	W2 JUMPER	Allows selection for kV/mA or mA contral (1-2 for kV/mA) (1-3 for mA)

TABLE C-2

TEST POINTS

LOCATION	NAME	MEASUREMENT
ADAPTATION BOARD BV25 WN23	Measuring Point 1	
CAMERA CONTROL BOARD WN11	Measuring Point 1	0V to -10.0V ± 0.7V
	Measuring Point 2	0V to +6.2V ± 0.4V
	Measuring Point 3	
	Measuring Point 5 (X2:4)	
	Measuring Point 6 (X2:8)	
	Measuring Point 7 (X1:14)	
	Measuring Point 8 (X2:10)	
	Measuring Point 9 (X1:11)	
	Measuring Point 10 (X2:13)	
	Measuring Point 11 (X2:12)	

TABLE C-2 (Cont.)

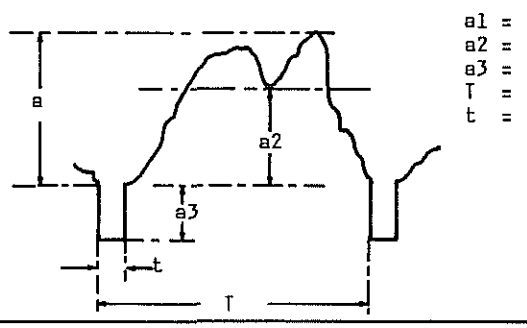
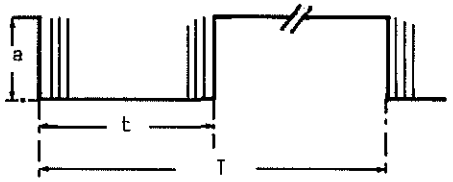
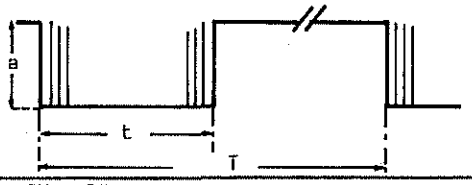
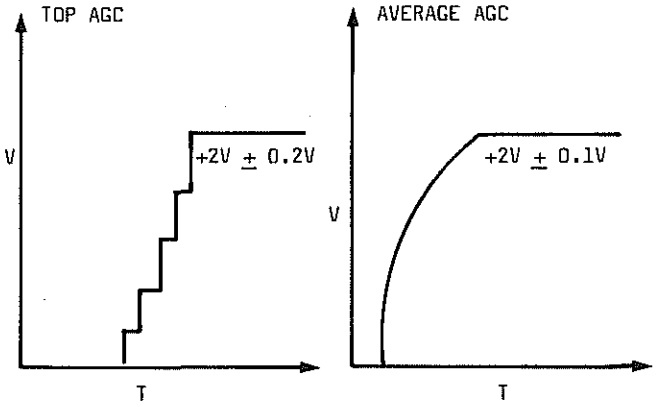
LOCATION	NAME	FUNCTION
VIDEO PROCESSING BOARD WN13	Measuring Point 1	0V ± 2%
	Measuring Point 2	
	Measuring Point 3	
AGC/Id BOARD WN17	Measuring Point 1	
	Measuring Point 2	
	Measuring Point 3	0V ± 2%
	Measuring Point 11 (X1:16)	

TABLE C-2 (Cont.)

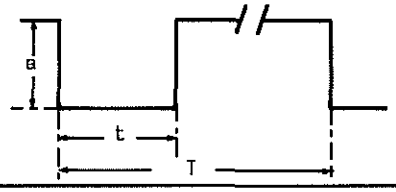
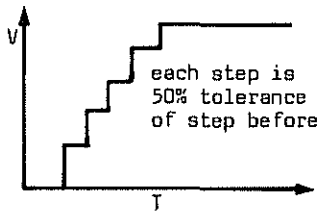
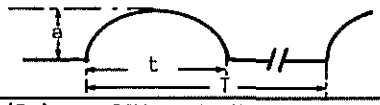
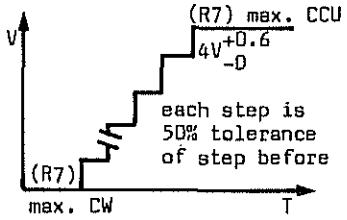
LOCATION	NAME	FUNCTION
	Measuring Point 12 (X1:15)	 a = t = T =
	Measuring Point 13 (X2:4)	
	Measuring Point 14 (X2:6)	0V to
	Measuring Point 15 (X2:14)	 (R4) max. CW VGC LONG TERM LOCK-IN ACTIVATED FOR min. 50 ms, THEN OFF X2:9 must read 4.2V +0.4V -0.2V during Lock-In
	Measuring Point 16 (X1:20)	-15V ± 1V or +5V ± 1V
	Measuring Point 17 (X1:10)	 a = +5V ± 0.5V t = T =
	Measuring Point 18 (X2:7)	(R7) max CCW = -0.5V and -0.6V (R7) max CW = +0.5V and +0.6V
	Measuring Point 19 (X1:14)	(R2) max CCW = 3.2V and 3.8V (R2) max CW = 8.2V and 6.6V
	Measuring Point 20 (X2:15)	 Id MEASURING ACTIVE (X2:12=0) VIDEO GROUND (X1:12 to X1:1)
PULSE GENERATOR BOARD WN19	Measuring Point 1 (X1:6)	(R1) adjusts between 45 to 55 Hz 45 Hz = 1V to -8V; 55Hz = +1V to +12V.
MONITORING BOARD WN21	Measuring Point 1 (X1:19)	a = t = T =
	Measuring Point 2 (X1:5)	a = t = T =

TABLE C-2 (Cont.)

LOCATION	NAME	FUNCTION
kV CONTROL BOARD WN22	Measuring Point 1 (X1:7)	(R1) max CW = $\leq$ -2V with 0V at (X1:9) (R1) adjust nominal = 0V $\pm$ 0.5V with 10V $\pm$ 0.1V at (X1:9) and (R2) adjusted to $\pm$ 0.5V with 0V at (X1:9)
	Measuring Point 2 (X1:3)	
	Measuring Point 3 (X1:15)	With 0V at (X1:9) and a 250 KHz signal at (X1:14), MP3 = 0V $\pm$ 50 mV.
	Measuring Point 4 (X1:19)	(V_{MP4} x 4 - 6V) $\pm$ 0.5V = (X1:6)V
	Measuring Point 5	-6V ($\pm$ 0.5V) to +12V ($\pm$ 2V)

TABLE C-3

INDICATORS

LOCATION	NAME	FUNCTION
STABILIZED POWER SUPPLY BOARD WN2	V26 LED	Energizes when
CAMERA CONTROL BOARD WN11	H1 LED	Energizes when
VICEO PROCESSING BOARD WN13	H1 LED	Energizes when
AGC/Id BOARD WN17	H1 LED	Energizes when
	H2 LED	Energizes when
PULSE GENERATOR BOARD WN19	H1 LED	Energizes when
MONITORING BOARD WN21	H1 LED	Energizes when
kV CONTROL BOARD WN22	H1 LED	Energizes when

Section D: ACCEPTANCE

CONTENTS

1. INTRODUCTION D-1

1. INTRODUCTION

The XTV5 Camera Control Unit FB has no separate acceptance check list. See the group level documentation for the applicable acceptance check-list.

Section E: PREVENTIVE MAINTENANCE

CONTENTS

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2. PREVENTIVE MAINTENANCE E-1

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2.2. CLEANING E-1

2.3. SPECIAL ADJUSTMENTS E-1
2.3.1. Adaptation Board BV25 WN23 E-1
2.3.2. Camera Control Board WN11 Adjustments E-2
2.3.3. Video Processing Board WN12 Adjustments E-2
2.3.4. AGC/Id Board WN17 Adjustments E-3
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2.3.6. Mounting Board WN21 Adjustments E-4
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1. INTRODUCTION

This section describes routine checks for the maintenance of the XTV5 Camera Control Unit FB.

2. PREVENTIVE MAINTENANCE

2.1. GENERAL

(1) General preventive maintenance procedures includes checking for signs of overheating and for signs of condensation devleoping at connection points.

(2) Visually check all equipment for signs of malfunctioning.

(3) If the systems has been changed within which this control unit has been installed check that the programming facilities reflect these changes.

(4) All equipment should be routinely inspected in accordance with local safety regulations to ensure safe and trouble free operation.

2.2. CLEANING

The inferior of the control unit should be cleaned as often as experience indicates is necessary to prevent dust or grime from accumulating.
For cleaning, use forced air or a vacuum and a soft-bristle brush.
Handle etched-circuit board carefully; otherwise leads on components or etched circuit paths could be broken.

2.3. SPECIAL ADJUSTMENTS

Unless otherwise stated, the following adjustments must be made with a camera and monitor which are in good working condition.

See Section C for a list of recommended test equipment.

2.3.1. Adaptation Board BV25 WN23 Adjustments

(1) Set the power ON.

(2) Put the Adaptation Board BV25 WN23 on an extender; set the Power ON.

(3) If the FAIL POSITION LED lights, switch the Power to OFF and reverse the position of the Adaptation Board BV25 WN23. Set the Power ON.

(4) Using (X1:A) for the gorund return, with an accurage dc voltmeter, measure the dc voltages at points (X1:7) and (X1:4).
If these voltages are not within specifications, adjust potentiometer (R1) until the output measured at point (X1:7) read between 0V $\pm$ 10 mV and 10.0V to 10.9V. Adjust potentiometer (R2) until the output measured at point (X1:4) reads between 0V $\pm$ 10 mV and 5V $\pm$ 400 mV.

2.3.1. Adaptation Board BV25 WN23 (Cont.)

5) If it is not possible to adjust (R1) so that the readings meet specifications, check in accordance with Section F, TROUBLESHOOTING, to isolate the fault.

6) Set the Power to OFF, remove the Stabilized Power Supply Board WN2 from the extender and replace.

2.3.2. Camera Control Board WN11 Adjustments

1) Set the Power OFF.

2) Put the Camera Control Board WN11 on an extender, set the Power ON.

3) If the FAIL POSITIONED LED lights, switch the Power OFF and reverse position of the Camera Control Board,WN11. Set the Power ON again.

4) Using (X1:22) or (X1:1) as ground return with an accurate dc voltmeter or oscilloscope execute the following measurements.

5) To check target voltage, turn (R12) fully clockwise so that the voltage reads between 0.58V and 0.65V measured at measuring point 9 (X1:11). Turn (R12) fully counterclockwise so that the voltage reads 0V ± 0.1V.

6) To check alignment voltages, turn (R10) for point (X2:9) and (R11) for point (X2:17) fully counterclockwise so that the voltage at either point is more negative then -9V and more positive than -10.9V. Turn (R10) and (R11) fully clockwise so that the voltage at points (X2:9) and (X2:17) read > +8.5V and < +10.7V.

7) To check target negative protection voltage, turn (R6) fully counter-clockwise so that the voltage at point (X2:5) reads 0V ± 0.05V. Apply 0V to point (X1:17); the voltage should read 0V ± 0.05V. Then, turn (R6) fully clockwise so that the voltage between -4.6V and -5.51V.

8) To check Vg-adjust voltage, turn (R6) until point (X2:5) reads 0V and turn (R7) fully counterclockwise such that the voltage at points (X1:20) reads 0V ± 0.01V. Turn (R6) until point: (X2:5) reads -4V such that the voltage at points (X1:20) reads 0.4V ± 0.5V. Turn (R6) until point (X2:5) reads 0V and turn (R7) fully clockwise such that the voltage at point (X1:20) reads -10V ± 0.7V.

9) To check the vertical amplitude, turn (R3) fully counter clockwise such that the voltage at point (X1:15) reads 0V ± 0.1V. Request vertical Scan Inverse ; the reading should stay the same. Turn (R3) fully clockwise such that the voltage at point (X1:15) reads +10.02V ± 0.7V. Remove the Vertical Scan Inverse request. The voltage should not deviate more then 2%.

10) To check vertical shift voltage, turn (R4) fully counter clockwise such that the voltage at point (X1:18_ reads 0V ± 0.1V. Turn (R4) fully clockwise such that the voltage at point (X1:8) reads +10V ± 0.7V. Request vertical Scan Inverse ; turn (R5) fully counter clockwise such that the voltage at point (X1:18) reads 0V ± 0.1V. Turn (R5) fully clockwise such that the voltage at point (X1:18) reads +10V ± 0.7V.

11) To check horizontal shift voltage, turn (R2) fully counter clockwise such that the voltage at point (X1:10) reads -9.3V ± 1V. Turn (R2) fully clockwise such that the voltage at point (X1:10) reads -9.5V ± 0.7V. Request Horizonal Scan Reverse ; turn (R1) fully counter clockwise such that the voltage at point (X1:10) reads -9.3V ± 1V. Turn (R1) fully clockwise such that the voltage at point (X1:10) reads -9.5V ± 0.7V.

12) To check horizontal amplitude voltage, connect a resistor of 1W between (X2:11) and 0V. Position jumper switch W1 to connect points 1 and 2. Turn (R8) fully counter clockwise such that the voltage as read at point (X2:11) reads between 1.07V and 1.45 V. Turn (R8) fully clockwise such that the voltage at point (X2:11) reads 0V. Position jumper switch W1 to connect points 4 and 3. Turn (R8) fully counter clockwise such that the voltage at point (X2:11) reads between 2.00V and 2.54V. Turn (R8) fully clockwise such that the voltage at point (X2:11) reads 0V.

13) To check the statis focus voltage, connect a resistor of 1W between point (X2:14) and 0V. Turn (R4) fully counter clockwise such that the voltage at point (X2:14) reads between -2.2V and -4V. Turn (R9) fully clockwise such that the voltage at point (X2:14) reads between -6.0V and -9V.

14) If it is not possible to adjust the Camera Control Board WN1 properly, check in accordance with Section F, TROUBLESHOOTING, to isolate the fault.

15) Set the Power OFF, remove the camera Control Board WN11 from the extender and replace.

2.3.3. Video Processing Board WN13 Adjustments

1) Set the Power OFF.

2) Put the Video Processing Board WN13 on an extender; set the Power ON.

3) If the FAIL POSITION LED lights, switch the Power Switch S1 OFF and reverse position of the Video Processing Board WN13. Set the Power ON again.

4) Using (X1:22) or (X1:1) as ground return, with an accurate oscilloscope execute the following measurements.

5) To adjust the set-up request clean-circle and turn (R3) such that the set-up is 35 mV ± 10% as measured at measuring point 3.

6) To adjust the variable gain amplification, apply 0V ± 10 mV to point (X2:11), 4V ± 10mV to point (X2:9), and a video signal without sync but with composite blanking at point (X3:1) with an amplitude of approximately 100 mV. Check at (X1:12) that the signal is at 0V ± 50 mV.before the end of the clamp pulse. Turn (R1) fully counter clockwise. Turn (R2) such that the measurement at (X1:12) = that at measuring point 3 ± 10%. Apply 0V ± 10 mV to point (X2:9) and a video signal of approximately 1000 mV to point (X3:1). Turn (R1) such that the amplification as measured at measuring point 3 is 0.59 ± 1.5%X.

7) If it is not possible to adjust the Video Processing Board WN13 properly, check in accordance with Section F, TROUBLESHOOTING, to isolate the fault.

8) Set the Power to OFF, remove the Video Processing Board WN13 from the extender and replace.

2.3.4. AGC/Id Board WN17 Adjustments

1) Set the Power OFF.

2) Put the AGC/Id Board WN17 on an extender, set the Power ON.

3) If the FAIL POSITION LED lights, switch the Power to OFF, and reverse position of the AGC/Id Board WN17. Set the ON again.

4) Using (X1:22) or (X1:1) as ground return, with an accurate oscilloscope execute the following measurements.

5) To check the AGC threshold adjustment voltage, apply a voltage of $1V_{tt}$ to point (X1:12). Measure at point (X2:9) while turning (R4) from counter clockwise to fully clockwise and that the voltage changes from 0+100mV to 4V+0.6V
-500mV -0V.
Turn (R4) fully counter clockwise.
Give the command VGC LOCK/LONG TERM. The measurement should now read 0mV ± 60 mV. Remove the command and turn (R4) fully clockwise.
Give the command once again for at least 50 mS.
The measurement should now read 4.2V+0.4V
-0.2V.
Remove the command. Check that the signal at (X2:14) is an equally stepped stair case voltage.

6) To check the dark current control, short circuit point (X1:12) by connecting to (X1:1). Give the command Id MEASURING. Measure the voltage at point (X2:11) while turning (R7) counter clockwise from a fully clockwise position such that the reading changes from 0V+100mV to 4V+0.6V
-500mV -0V.
Check that the signal at (X2:15) is an equally stepped staircase voltage.

7) To check the dark current control threshold voltage, turn (R7) counter clockwise such that the voltage at point (X2:7) reads between -0.5V and -0.6V. Turn (R7) fully clockwise such that the voltage at point (X2:7) read between -0.5V and +0.6V.

8) To adjust the manual dark current voltage, connect jumper W4 to connect points 1 and 3. Turn (R6) fully clockwises such that a voltage at points (X2:11) is greater than 4.5V and less than 5.5V. Turn (R6) fully counter clockwise such that the voltage at point (X2:11) reads 0V ± 50 mV.

9) To check the circle blanking voltage, make Id Reset low at point (X2:20) and connect jumper switch W3 to connect points 1 and 2. Turn (R5) fully counter clockwise. Apply 4.5V at point (X2:16). The voltage at point (X2:18) should be high (5V). Make Id Reset high at point (X2:20) such that the voltage at point (X2:18) goes low. Make Id Reset low again, and turn (R5) fully clockwise such that the voltage at point (X2:18) goes low.

10) To adjust the measuring field, turn (R2) fully counter clockwise such that the voltage at point (X1:14) is between 3.2V and 3.8V. Turn (R2) fully clockwise such that the voltage at point (X1:14) is between 8.2V and 6.6V.
Request small measuring field. Turn (R3) fully clockwise such that the voltage at point (X1:14) is between 9.2V and 7.6V. Turn both (R2) and (R3) fully counter clockwise such that the voltage at point (X1:14) lies between 3.2V and 3.8V.
Remove the request for a small measuring field. Adjust (R2) such that the voltage at point (X1:14) is 4V ± 100mV.
Request small measuring field and adjust (R3) such that the voltage at point (X1:14) is 5V ± 100 mV.

11) If it is not possible to adjust the AGC/Id Board WN13 properly, check in accordance with Section F, TROUBLESHOOTING, to isolate the fault.

12) Set the Power Switch S1 to OFF; remove the AGC/Id BOARD WN17 from the extender and replace.

2.3.5. Pulse Generator Board WN19 Adjustments

1) Set the Power OFF.

2) Put the Pulse Generator Board WN19 on an extnder; set the Power to ON.

3) If the FAIL POSITION LED lights, switch the Power to OFF, and reverse position of the Pulse Generator Board WN19. Set the Power ON again.

4) Using (X1:22) or (X1:1) as ground return with an accurate oscilloscope execute the following measurements.

5) To adjust the mains lock control, proceed as follows:

a) For coarse adjustment, switch off supply voltages, Position jumper switch W1 to connect points 1 and 2 and W2 to connect points 1-2. Apply 0V to point (X2:8).
Connect point (X1:12) to one channel of the scope. Apply a mains reference colrage of 50 Hz ± 0.1Hz, $2V_{eff} \approx 5.5V_{tt}$ to point (X1:8).
Switch on the supply voltages. Turn (R1) such that period of the line blanking at (X1:12) is 32 µsec ± 2 µsec.

2.3.5. Pulse Generator Board Adjustments (Cont.)

5) b) For line adjustments, remove OV from (X2:8). The oscillator should now lock in the mains frequency within approximately 1 sec. The voltage as measured at point (X1:6) must remain constant (0.5V variation). Turn (R1) sucht that the voltage at point (X1:6) is 0 ± 0.5V.

6) If it is not possible to adjust the Pulse Generator Board WN19 check in accordance with Section F, TROUBLESHOOTING, to isolate the fault.

7) Set the Power to OFF, remove the Pulse Generator Board WN19 from the extender and replace.

2.3.6. Monitoring Board WN21 Adjustments

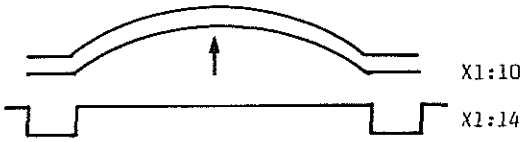
1) Set the Power OFF.

2) Put the Monitoring Board WN21 on an extender; set Power ON.

3) If the FAIL POSITION LED lights, switch the Power to OFF, and reverse position of the Monitoring Board WN21. Set the power to ON again.

4) Using (X1:22) or (X1:1) as ground return, with an accurage oscilloscope execute the following measurements.

5) To adjust the modeulated H-parabola, set-up the control unit and camera for 625 lines. Connect one channel of the scope to point (X1:10) and the other channel of the scope to point (X1:10) and the toher channel to point (X1:14). Turn (R1) fully clockwise such that the raster amplitude is greater than 2.3V. Turn (R1) fully counter clockwise sucht that the raster amplitude is less than 2.10V.



6) If it is not possible to adjust the Monitoring Board WN21, check in accordance with Section F, TROUBLESHOOTING, to isolate the fault.

7) Set the Power OFF, remove the Monitoring Board WN19 from the extender, and replace.

2.3.7. kV Control Board WN22 Adjsutments

1) Set the Power OFF.

2) Put the kV Control Board WN22 on an extender, set the Power ON.

3) If the FAIL POSITION LED light, switch the Power to OFF, and reverse position of the kV Control Board WN22. Set the Power to ON again.

4) Check that jumper switches W1 and W2 are connecting points 1 and 2. Using (X1:22) or (X1:1) as ground return with an accurate oscilloscope execute the following measurements.

5) To adjust the control amplifier apply a voltage of OV at point (X1:9). Turn (R2) fully clockwise such that the voltage at point (X1:7) reads less then -2V. Turn (R2) fully counter clockwise such that the voltage at points (X1:7) read OV ± 0.5V. Turn (R1) fully counter clockwise. Apply a voltage of 10V ± 0.01V at point (X1:9). Turn (R1) clockwise such that the voltage at point (X1:7) rises from OV to a voltage greater then +2V. Turn (R1) clockwise such that the voltage as measured at point (X1:7) read OV ± 0.5V.

6) To adjust the kV control voltage, apply a video signal of 200 mV ± 10 mV at point (X1:14) and OV at point (X1:9). Adjust (R2) such that the voltage at point (X1:6) read +6V ± 0.1V. Apply a video signal of 1200 mV ± 10 mV at point (X1:9). Adjust (R1) sucht that a voltage at point (X1:6) reads +1.2V ± 0.1V.

7) If it is not possible to adjust the kV Control Board WN22, check in accordance with Section F, TROUBLESHOOTING, to isolate the fault.

8) Set the Power to OFF, remove the kV control Board WN22 from the extender, and replace.

Section F: CORRECTIVE MAINTENANCE

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1. INTRODUCTION F-1

2. TEST EQUIPMENT RECOMMENDED F-1

3. SPECIAL TOOLS F-1

4. TROUBLESHOOTING PROCEDURES F-1

4.1. GENERAL F-1

4.2. SPECIFIC F-1

LIST OF FLOW DIAGRAMS

XTV5 CAMERA CONTROL UNIT GENERAL TROUBLESHOOTING F-2

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LOOP F2: PULSE GENERATOR F-12

LOOP F3: DOSE RATE CONTROL F-16

LOOP F4: CAMERA SUPPLY F-20

LOOP F5: VIDEO PROCESSING F-24

1. INTRODUCTION

This section contains troubleshooting procedures and a list of approved test equipment.

2. TEST EQUIPMENT REQUIRED

Multimeters

PM2411
PM2412/01/02
PM2412A
PM2503
PM2517x (preferred)

Oscilloscope

PM3110
PM3210
PM3231
PM3200
PM3235
PM3226
PM3232
PM3233
PM3240

3. SPECIAL TOOLS

Special flat cable extenders will be necessary to measure the p.c.b. and plug points.

4. TROUBLESHOOTING PROCEDURES

4.1. GENERAL

Familiairy with the circuit is recommended before any troubleshooting is attempted. Please ensure that this unit is the source of malfunction. Consult the sub-system and generate level troubleshooting flow diagrams before beginning. See Section G: EXPLANATIONS, for a description of flow chart symbols.

4.2. SPECIFIC

WARNING

Stock hazards as high as 1000V are exposured when operating the camera without the load.

(1) Remove the camera hood. Connect boards WK1, WK2, WK3 and WK4 to boards WK5 and WK6 with the flat cable exteners.
See Figure BZ-1.

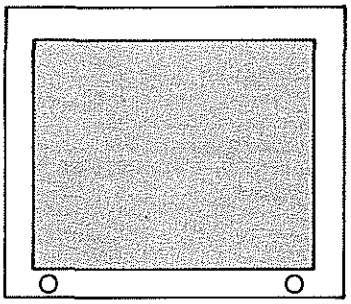
(2) Connect a correctly functioning control unit and monitor to the XTV5 Camera.

(3) After identifying the functional loop that appears to be faulty, trace the malfunction as indicated in the flow chart.

(4) After locating the malfunction with the help of the TROUBLESHOOTING CHARTS (Detail 2 on the Z3-drawings), repair or replace as is appropriate.

(5) After repair or replacmeent, check through the troubleshooting loop once again.

XTV5 CONTROL UNIT GENERAL TROUBLESHOOTING



BRIGHTNESS CCU POWER OFF, NO IMAGE

YES

YES

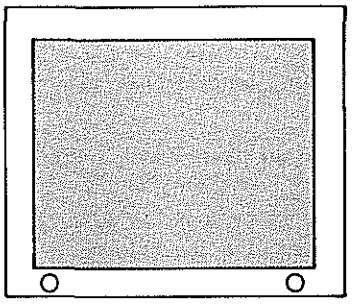
POWER TRANSFORMER DEFECT

TRANSFER RELAYS DEFECT

SHORT CIRCUIT

Check in accordance with LOOP F1

NO



BRIGHTNESS CCU POWER ON, NO IMAGE

YES

YES

POWER SUPPLY AND/OR LOW VOLTAGE SUPPLY DEFECT

Check in accordance with LOOP F1

DEFECTIVE VIDEO AMPLIFICATION

Check in accordance with LOOP F5

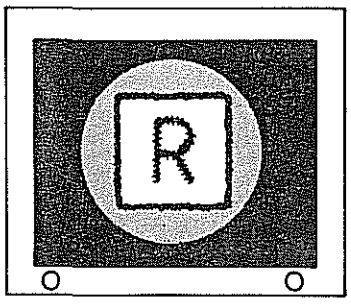
V_g CONTROL DEFECT

V_a CONTROL DEFECT

FOCUSSING SUPPLY VOLTAGES FAULTY

Check in accordance with LOOP F4

NO



ENTIRE IMAGE FOCUSED

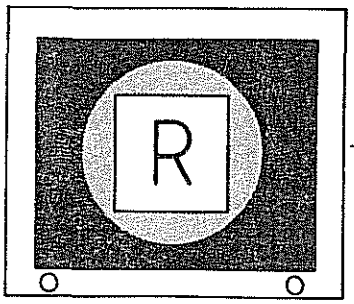
NO

NO

FOCUSSING SUPPLY VOLTAGES FAULTY

Check in accordance with LOOP F4

YES



GOOD CONTRAST BLACKS/ WHITE

NO

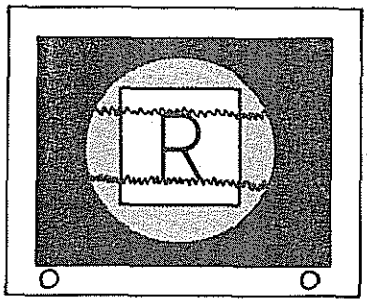
NO

INSUFFICIENT VIDEO GAIN

Check in accordance with LOOP F5

YES

A



A

BRIGHTNESS UNIFORM, GOOD WHITE/ NEAR WHITE RES.

NO

NO

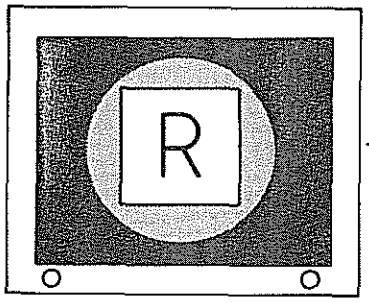
YES

POWER SUPPLY AND/OR LOW VOLTAGE SUPPLY DEFECT

Check in accordance with LOOP F1

V_g CONTROL DEFECT

Check in accordance with LOOP F4



GOOD DETAIL IN HIGH-LIGHTS

NO

NO

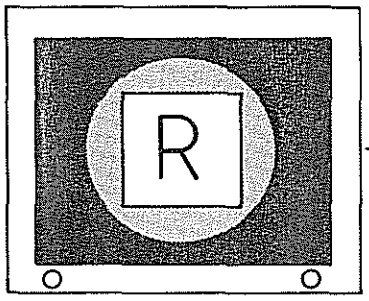
YES

WHITE CLIPPING FUNCTION DEFECT

Check in accordance with LOOP F5

V_a CONTROL DEFECT

Check in accordance with LOOP F4



GOOD RESOLUTION GREYS

NO

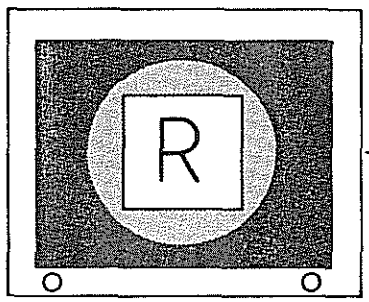
NO

YES

VIDEO GAIN CONTROL DEFECT

VIDEO AMPLIFICATION FAULTY

Check in accordance with LOOP F5



GOOD RESOLUTION GREYS/BLACKS

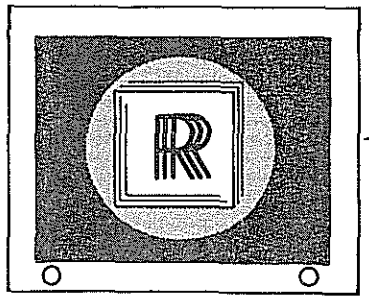
NO

NO

YES

SETUP INCORRECT IN VIDEO

Check in accordance with LOOP F5



ECHO

YES

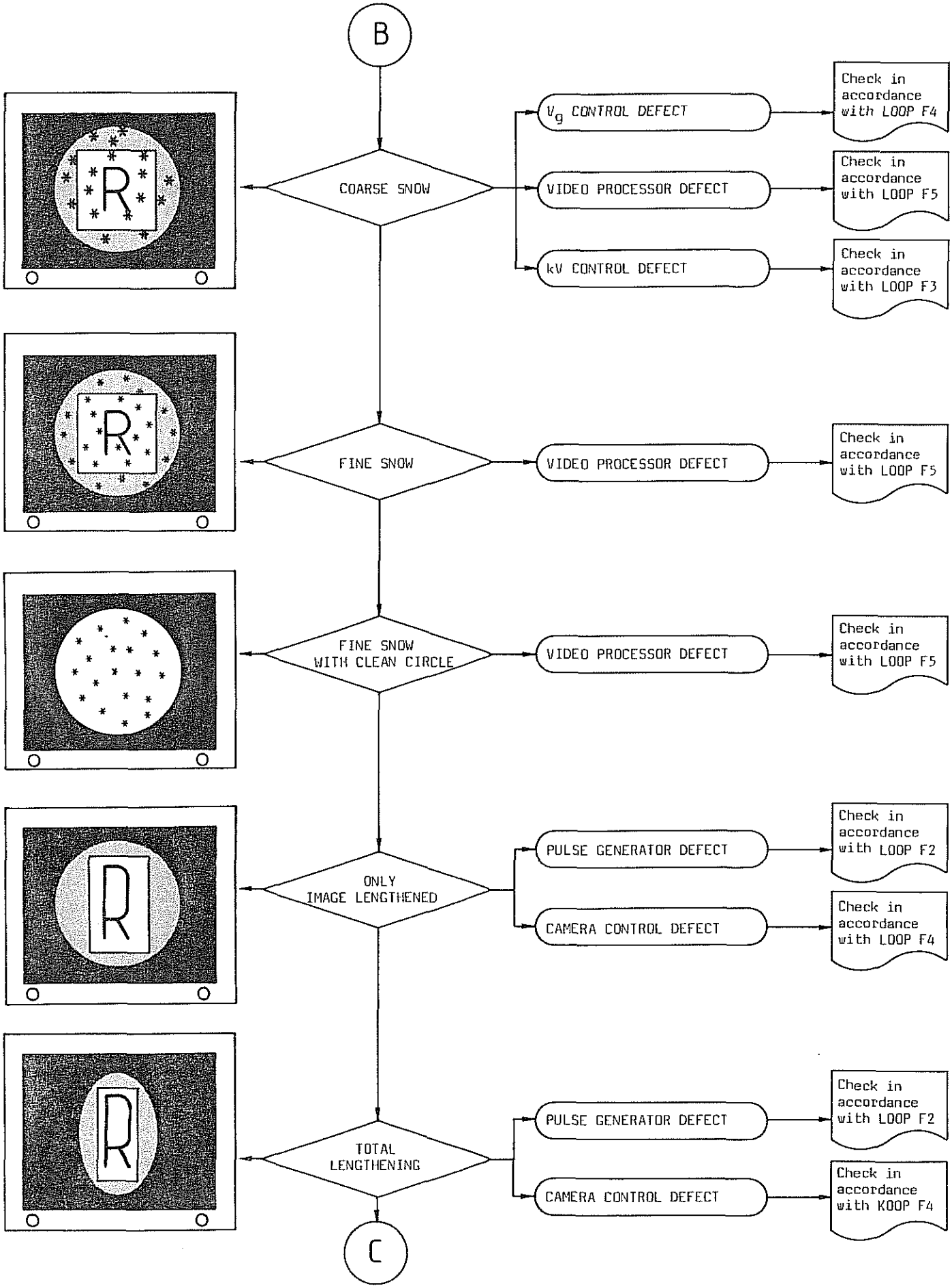
YES

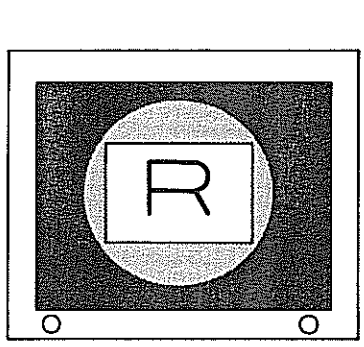
NO

VIDEO PROCESSOR DEFECT

Check in accordance with LOOP F5

B


B
R
COARSE SNOW
V_g CONTROL DEFECT
VIDEO PROCESSOR DEFECT
kV CONTROL DEFECT
Check in accordance with LOOP F4
Check in accordance with LOOP F5
Check in accordance with LOOP F3
R
FINE SNOW
VIDEO PROCESSOR DEFECT
Check in accordance with LOOP F5
FINE SNOW WITH CLEAN CIRCLE
VIDEO PROCESSOR DEFECT
Check in accordance with LOOP F5
R
ONLY IMAGE LENGTHENED
PULSE GENERATOR DEFECT
CAMERA CONTROL DEFECT
Check in accordance with LOOP F2
Check in accordance with LOOP F4
R
TOTAL LENGTHENING
PULSE GENERATOR DEFECT
CAMERA CONTROL DEFECT
Check in accordance with LOOP F2
Check in accordance with KOOP F4
C



C

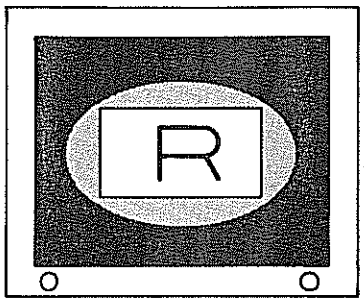
ONLY IMAGE WIDENED

PULSE GENERATOR DEFECT

Check in accordance with LOOP F2

CAMERA CONTROL DEFECT

Check in accordance with LOOP F4



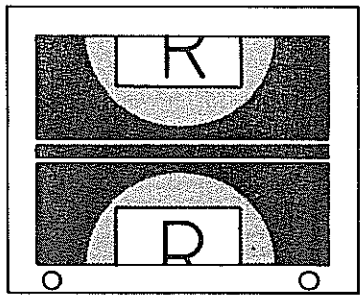
TOTAL WIDENING

PULSE GENERATOR DEFECT

Check in accordance with LOOP F2

CAMERA CONTROL DEFECT

Check in accordance with LOOP F4



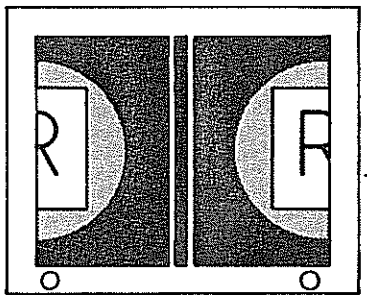
VERTICAL ROLLING

SYNC. AMPL. INCORRECT

Check in accordance with LOOP F2

VIDEO LAP-OVER TO SYNC.

Check in accordance with LOOP F5



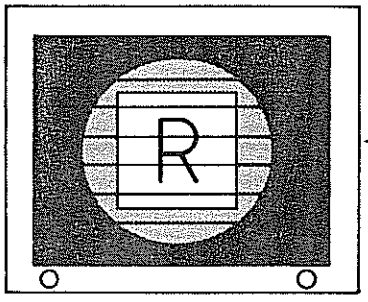
HORIZONTAL ROLLING

SYNC AMPL. INCORRECT

Check in accordance with LOOP F2

VIDEO LAP-OVER TO SYNC.

Check in accordance with LOOP F5

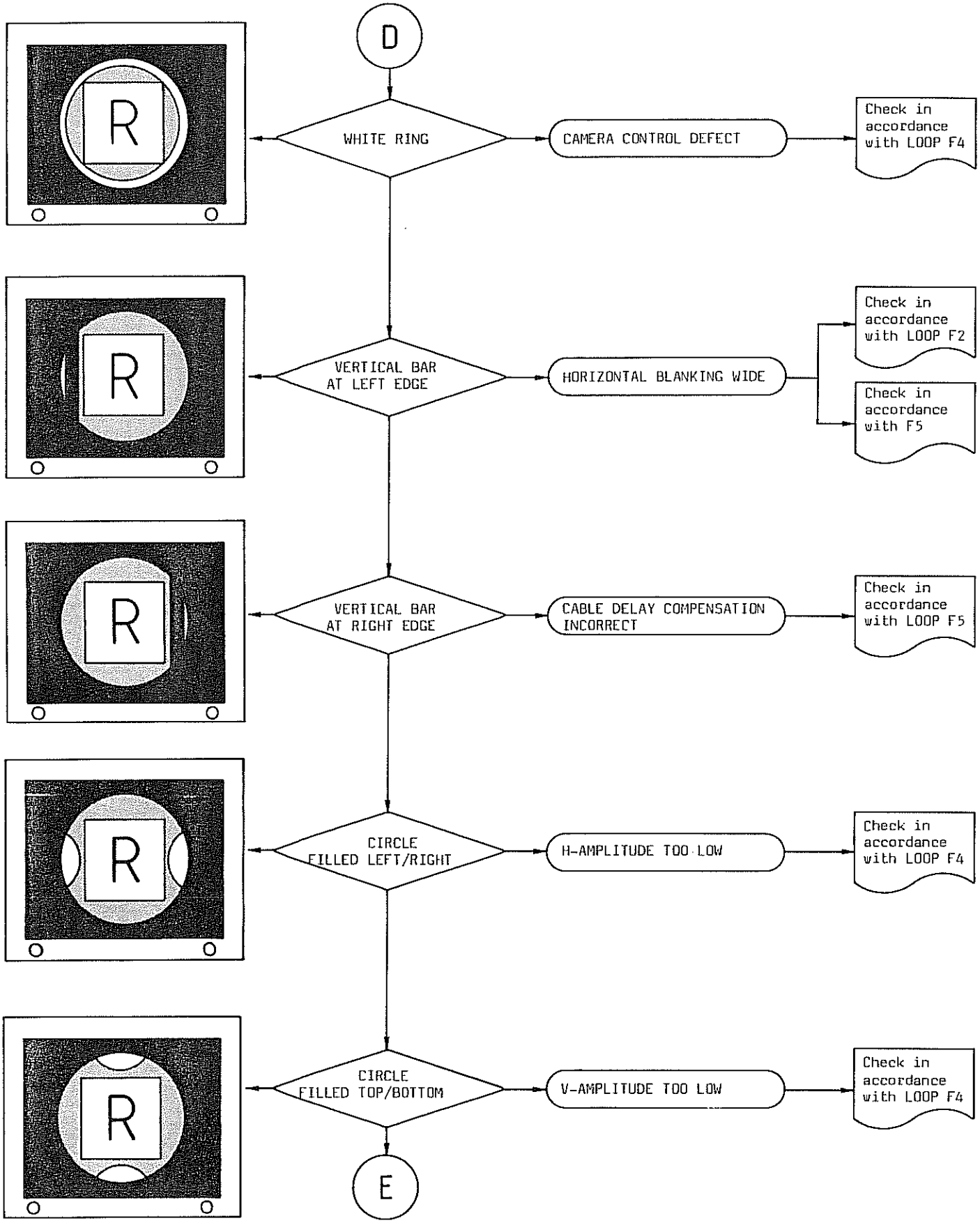


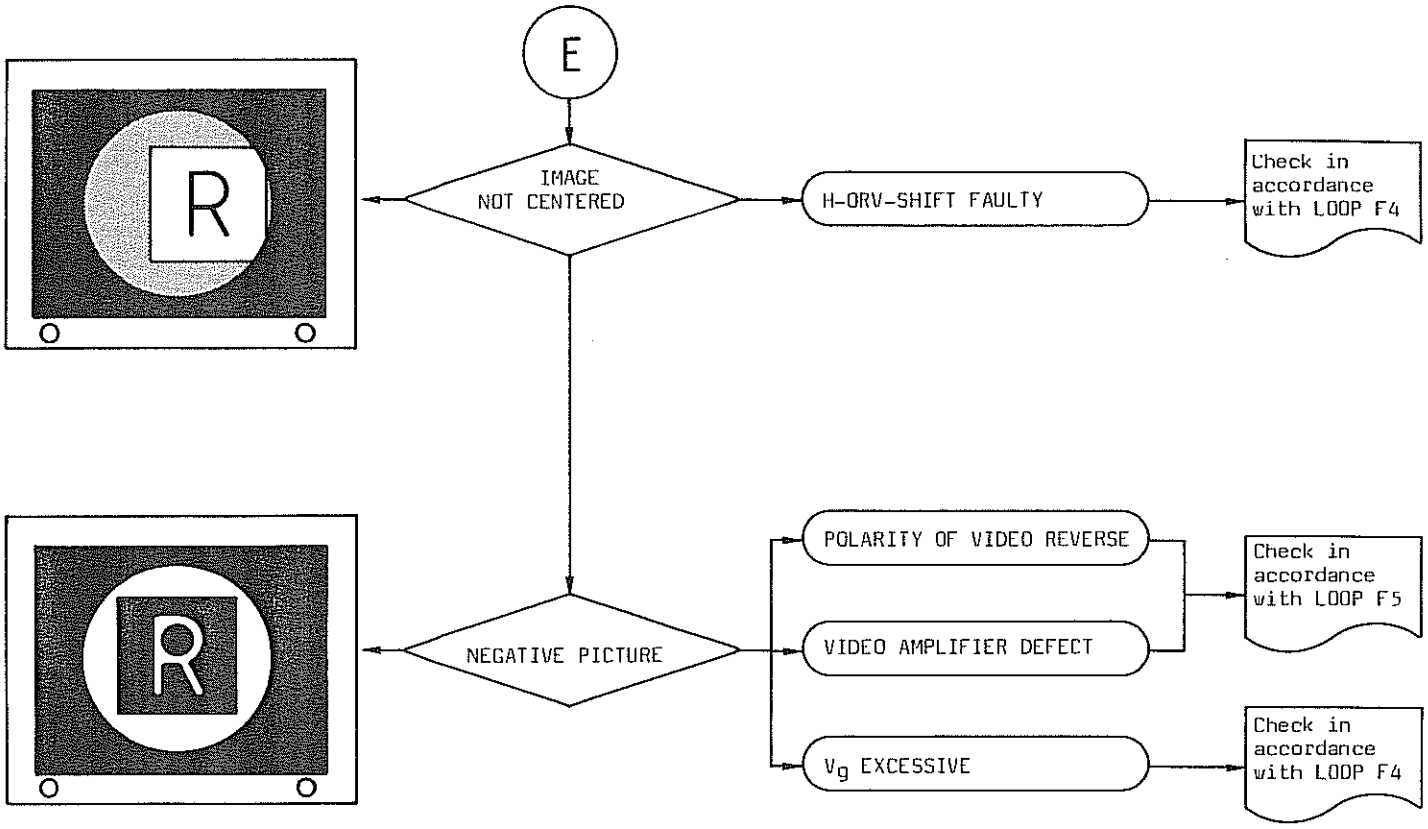
HORIZONTAL ROLLING BAR

RIPPLE IN POWER SUPPLY

Check in accordance with LOOP F1

D


D
R
WHITE RING
CAMERA CONTROL DEFECT
Check in accordance with LOOP F4
R
VERTICAL BAR AT LEFT EDGE
HORIZONTAL BLANKING WIDE
Check in accordance with LOOP F2
Check in accordance with F5
R
VERTICAL BAR AT RIGHT EDGE
CABLE DELAY COMPENSATION INCORRECT
Check in accordance with LOOP F5
R
CIRCLE FILLED LEFT/RIGHT
H-AMPLITUDE TOO LOW
Check in accordance with LOOP F4
R
CIRCLE FILLED TOP/BOTTOM
V-AMPLITUDE TOO LOW
Check in accordance with LOOP F4
E


E
IMAGE
NOT CENTERED
H-ORV-SHIFT FAULTY
Check in
accordance
with LOOP F4
NEGATIVE PICTURE
POLARITY OF VIDEO REVERSE
VIDEO AMPLIFIER DEFECT
Check in
accordance
with LOOP F5
V_g EXCESSIVE
Check in
accordance
with LOOP F4

LOOP F1: POWER SUPPLY VOLTAGES

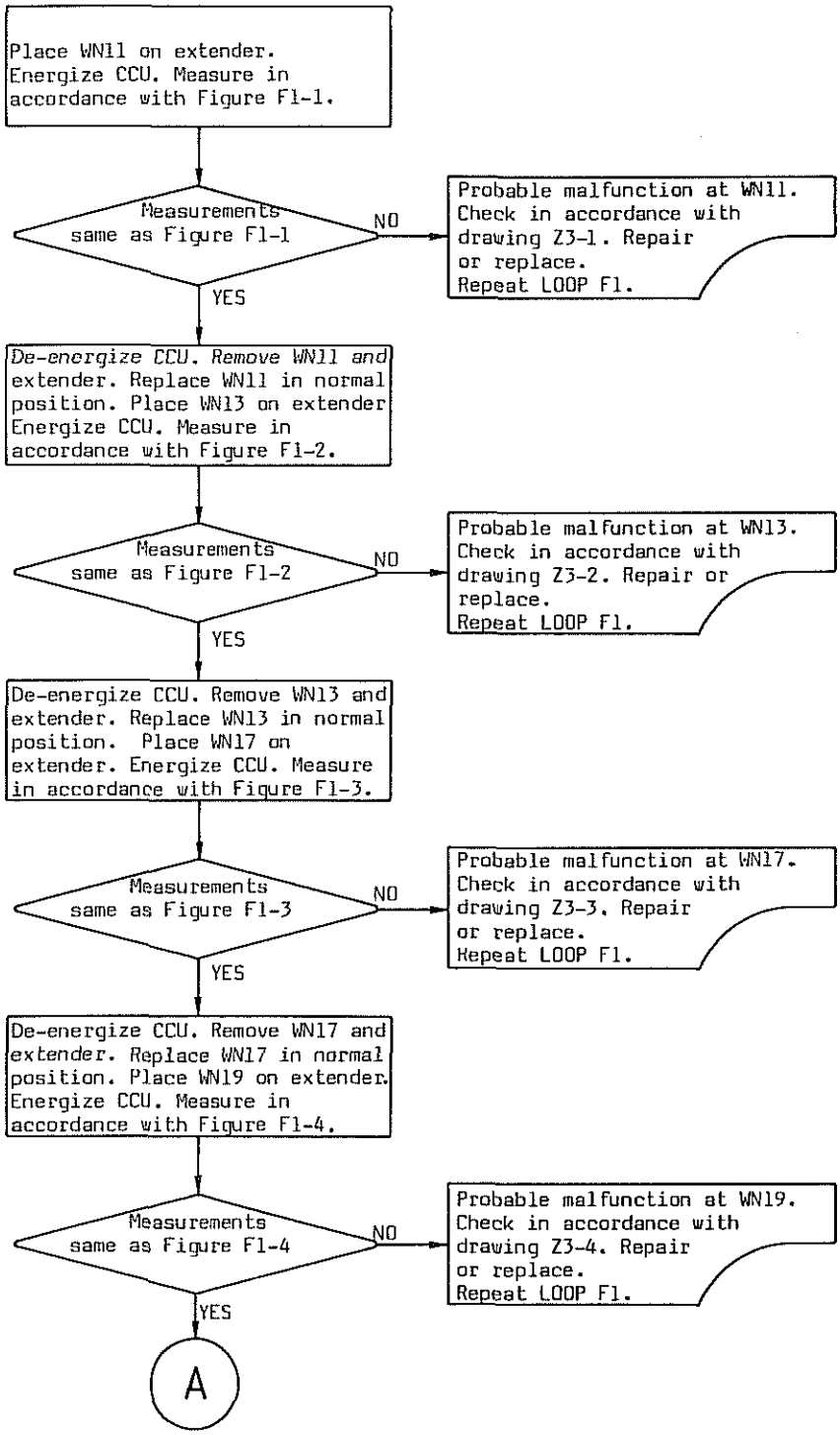

Place WN11 on extender. Energize CCU. Measure in accordance with Figure F1-1.
Measurements same as Figure F1-1
NO
Probable malfunction at WN11. Check in accordance with drawing Z3-1. Repair or replace. Repeat LOOP F1.
YES
De-energize CCU. Remove WN11 and extender. Replace WN11 in normal position. Place WN13 on extender Energize CCU. Measure in accordance with Figure F1-2.
Measurements same as Figure F1-2
NO
Probable malfunction at WN13. Check in accordance with drawing Z3-2. Repair or replace. Repeat LOOP F1.
YES
De-energize CCU. Remove WN13 and extender. Replace WN13 in normal position. Place WN17 on extender. Energize CCU. Measure in accordance with Figure F1-3.
Measurements same as Figure F1-3
NO
Probable malfunction at WN17. Check in accordance with drawing Z3-3. Repair or replace. Repeat LOOP F1.
YES
De-energize CCU. Remove WN17 and extender. Replace WN17 in normal position. Place WN19 on extender. Energize CCU. Measure in accordance with Figure F1-4.
Measurements same as Figure F1-4
NO
Probable malfunction at WN19. Check in accordance with drawing Z3-4. Repair or replace. Repeat LOOP F1.
YES
A

Figure F1-1

WN11 POINTS	MEASUREMENT
X1:2 X1:2	+15 V ± 2%
X1:4	+6.4V ± 2%
X1:3 X2:3	-15 V ± 2%

0V reference X1:1

Figure F1-2

WN13 POINTS	MEASUREMENT
X1:2 X2:2	+15 V ± 2%
X1:3 X2:3	-15 V ± 2%

0V reference X1:1

Figure F1-3

WN17 POINTS	MEASUREMENT
X1:2	+15 V ± 2%
X1:4	+6.4V ± 2%
X1:3	-15 V ± 2%

0V reference X1:1

Figure F1-4

WN19 POINTS	MEASUREMENT
X1:2 X2:2	+15 V ± 2%
X1:4	+6.4V ± 2%
X1:3 X2:3	-15 V ± 2%

0V reference X1:1

LOOP F1: POWER SUPPLY VOLTAGES (Cont.)

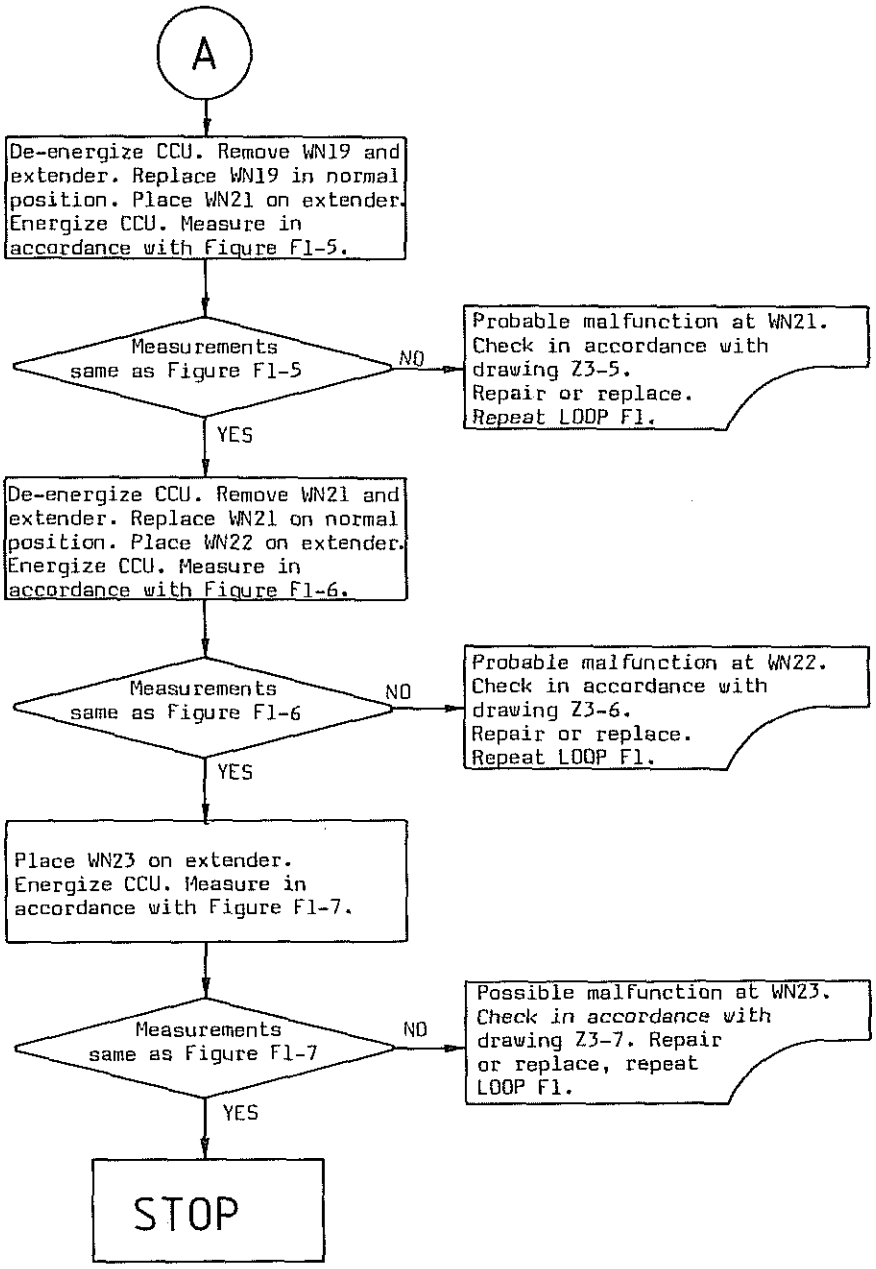

A
De-energize CCU. Remove WN19 and extender. Replace WN19 in normal position. Place WN21 on extender. Energize CCU. Measure in accordance with Figure F1-5.
Measurements same as Figure F1-5
NO
Probable malfunction at WN21. Check in accordance with drawing Z3-5. Repair or replace. Repeat LOOP F1.
YES
De-energize CCU. Remove WN21 and extender. Replace WN21 on normal position. Place WN22 on extender. Energize CCU. Measure in accordance with Figure F1-6.
Measurements same as Figure F1-6
NO
Probable malfunction at WN22. Check in accordance with drawing Z3-6. Repair or replace. Repeat LOOP F1.
YES
Place WN23 on extender. Energize CCU. Measure in accordance with Figure F1-7.
Measurements same as Figure F1-7
NO
Possible malfunction at WN23. Check in accordance with drawing Z3-7. Repair or replace, repeat LOOP F1.
YES
STOP

Figure F1-5

WN21 POINTS	MEASUREMENT
X1:2	+15 V ± 2%
X1:4	+6.4V ± 2%
X1:3	-15 V ± 2%

0V reference X1:1

Figure F1-6

WN22 POINTS	MEASUREMENT
X1:2	+15 V ± 2%
X1:4	+6.4V ± 2%
X1:3	-15 V ± 2%

0V reference X1:1

LOOP F2: PULSE DISTRIBUTION

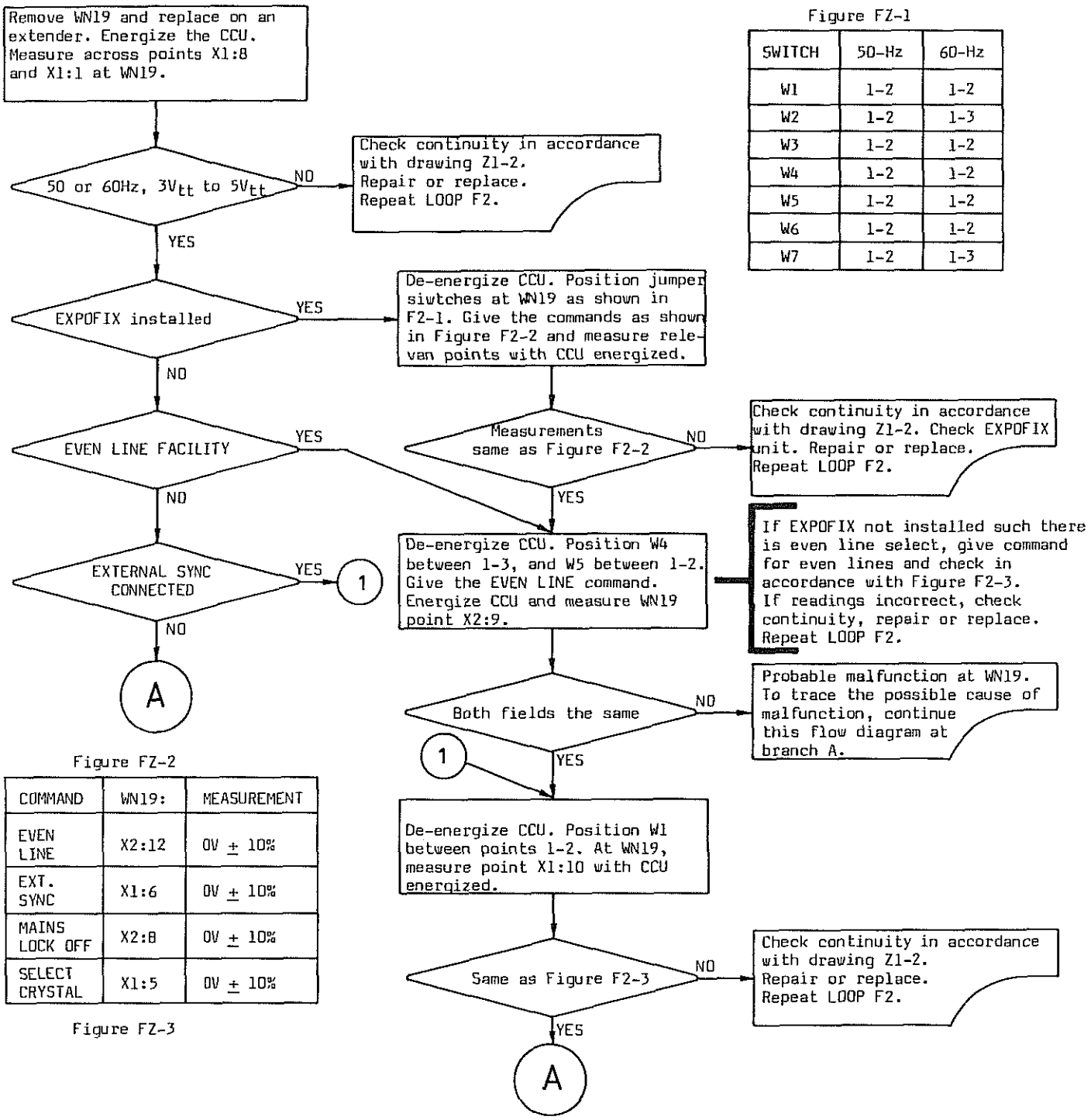

Remove WN19 and replace on an extender. Energize the CCU. Measure across points X1:8 and X1:1 at WN19.
50 or 60Hz, 3Vtt to 5Vtt
NO
Check continuity in accordance with drawing Z1-2. Repair or replace. Repeat LOOP F2.
YES
EXPOFIX installed
YES
De-energize CCU. Position jumper siwtches at WN19 as shown in F2-1. Give the commands as shown in Figure F2-2 and measure relevan points with CCU energized.
NO
EVEN LINE FACILITY
YES
Measurements same as Figure F2-2
NO
Check continuity in accordance with drawing Z1-2. Check EXPOFIX unit. Repair or replace. Repeat LOOP F2.
NO
YES
EXTERNAL SYNC CONNECTED
YES
1
De-energize CCU. Position W4 between 1-3, and W5 between 1-2. Give the EVEN LINE command. Energize CCU and measure WN19 point X2:9.
If EXPOFIX not installed such there is even line select, give command for even lines and check in accordance with Figure F2-3. If readings incorrect, check continuity, repair or replace. Repeat LOOP F2.
NO
A
Both fields the same
NO
Probable malfunction at WN19. To trace the possible cause of malfunction, continue this flow diagram at branch A.
1
YES
De-energize CCU. Position W1 between points 1-2. At WN19, measure point X1:10 with CCU energized.
Same as Figure F2-3
NO
Check continuity in accordance with drawing Z1-2. Repair or replace. Repeat LOOP F2.
YES
A

Figure FZ-1

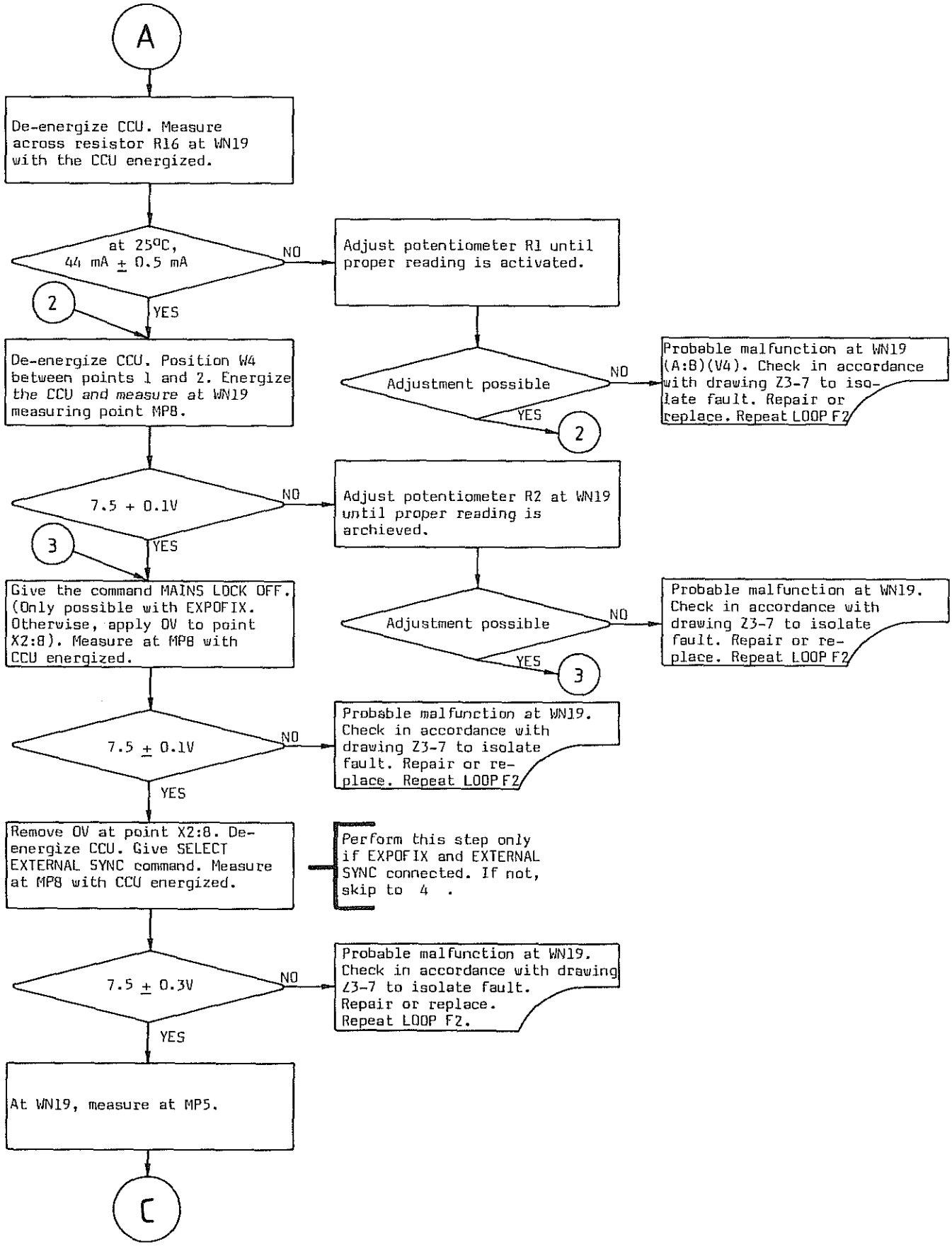
SWITCH	50-Hz	60-Hz
W1	1-2	1-2
W2	1-2	1-3
W3	1-2	1-2
W4	1-2	1-2
W5	1-2	1-2
W6	1-2	1-2
W7	1-2	1-3

Figure FZ-2

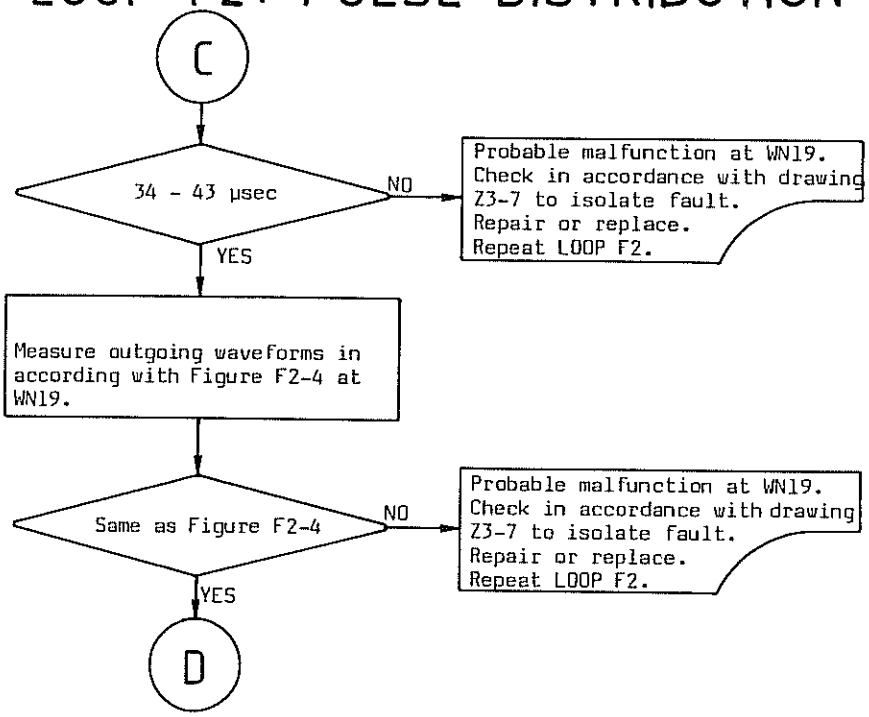
COMMAND	WN19:	MEASUREMENT
EVEN LINE	X2:12	0V ± 10%
EXT. SYNC	X1:6	0V ± 10%
MAINS LOCK OFF	X2:8	0V ± 10%
SELECT CRYSTAL	X1:5	0V ± 10%

Figure FZ-3

LOOP F2: PULSE DISTRIBUTION


A
De-energize CCU. Measure across resistor R16 at WN19 with the CCU energized.
at 25°C, 44 mA ± 0.5 mA
NO
Adjust potentiometer R1 until proper reading is activated.
2
YES
De-energize CCU. Position W4 between points 1 and 2. Energize the CCU and measure at WN19 measuring point MP8.
Adjustment possible
NO
Probable malfunction at WN19 (A:8)(V4). Check in accordance with drawing Z3-7 to isolate fault. Repair or replace. Repeat LOOP F2
YES
2
7.5 + 0.1V
NO
Adjust potentiometer R2 at WN19 until proper reading is archieved.
3
YES
Give the command MAINS LOCK OFF. (Only possible with EXPOFIX. Otherwise, apply 0V to point X2:8). Measure at MP8 with CCU energized.
Adjustment possible
NO
Probable malfunction at WN19. Check in accordance with drawing Z3-7 to isolate fault. Repair or replace. Repeat LOOP F2
YES
3
7.5 ± 0.1V
NO
Probable malfunction at WN19. Check in accordance with drawing Z3-7 to isolate fault. Repair or replace. Repeat LOOP F2
YES
Remove 0V at point X2:8. De-energize CCU. Give SELECT EXTERNAL SYNC command. Measure at MP8 with CCU energized.
Perform this step only if EXPOFIX and EXTERNAL SYNC connected. If not, skip to 4 .
7.5 ± 0.3V
NO
Probable malfunction at WN19. Check in accordance with drawing Z3-7 to isolate fault. Repair or replace. Repeat LOOP F2.
YES
At WN19, measure at MP5.
C

LOOP F2: PULSE DISTRIBUTION



LOOP F2: PULSE DISTRIBUTION

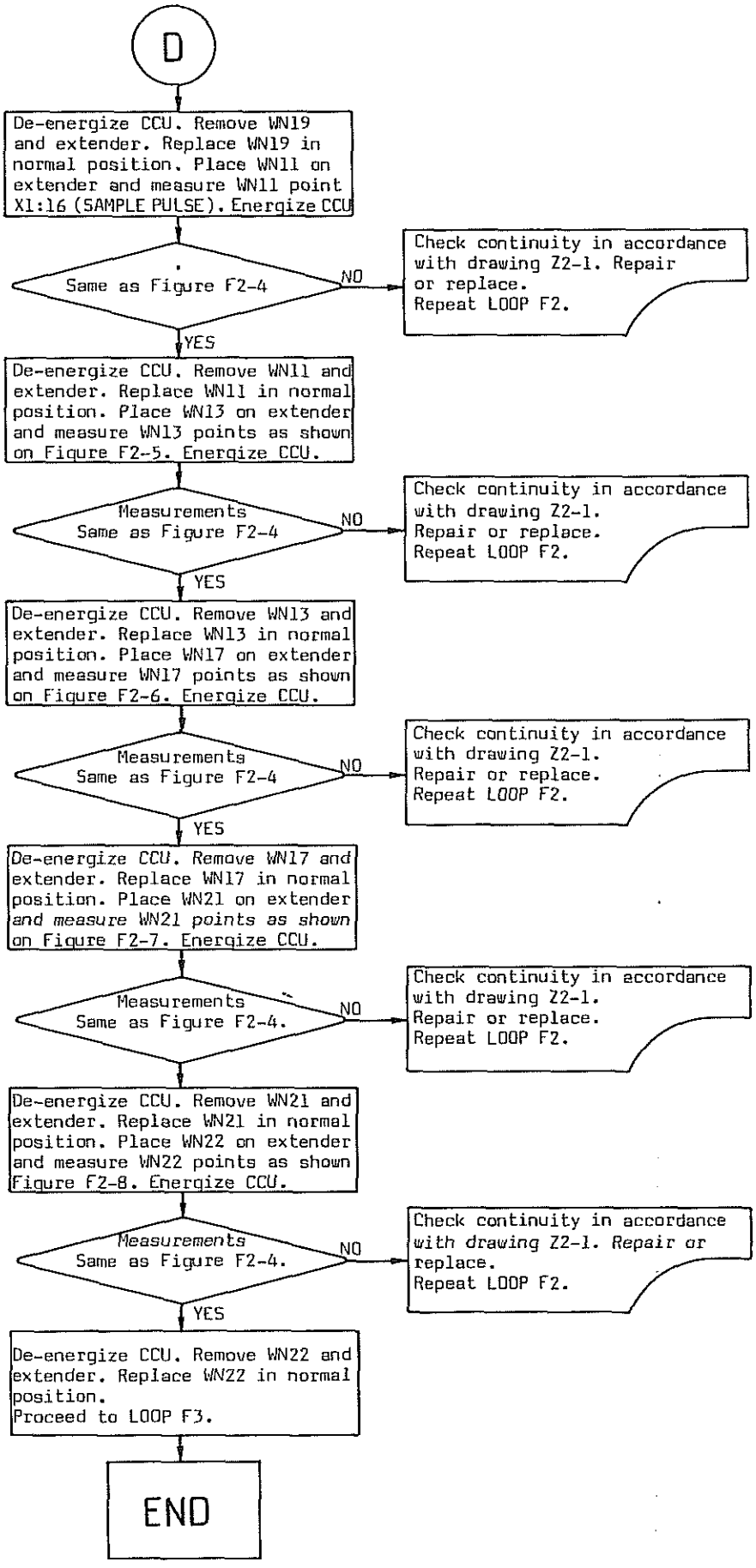

D
De-energize CCU. Remove WN19 and extender. Replace WN19 in normal position. Place WN11 on extender and measure WN11 point X1:16 (SAMPLE PULSE). Energize CCU
Same as Figure F2-4
NO
Check continuity in accordance with drawing Z2-1. Repair or replace. Repeat LOOP F2.
YES
De-energize CCU. Remove WN11 and extender. Replace WN11 in normal position. Place WN13 on extender and measure WN13 points as shown on Figure F2-5. Energize CCU.
Measurements Same as Figure F2-4
NO
Check continuity in accordance with drawing Z2-1. Repair or replace. Repeat LOOP F2.
YES
De-energize CCU. Remove WN13 and extender. Replace WN13 in normal position. Place WN17 on extender and measure WN17 points as shown on Figure F2-6. Energize CCU.
Measurements Same as Figure F2-4
NO
Check continuity in accordance with drawing Z2-1. Repair or replace. Repeat LOOP F2.
YES
De-energize CCU. Remove WN17 and extender. Replace WN17 in normal position. Place WN21 on extender and measure WN21 points as shown on Figure F2-7. Energize CCU.
Measurements Same as Figure F2-4.
NO
Check continuity in accordance with drawing Z2-1. Repair or replace. Repeat LOOP F2.
De-energize CCU. Remove WN21 and extender. Replace WN21 in normal position. Place WN22 on extender and measure WN22 points as shown Figure F2-8. Energize CCU.
Measurements Same as Figure F2-4.
NO
Check continuity in accordance with drawing Z2-1. Repair or replace. Repeat LOOP F2.
YES
De-energize CCU. Remove WN22 and extender. Replace WN22 in normal position. Proceed to LOOP F3.
END

Figure F2-5

WN13 POINTS	SIGNAL NAME
X2:20	DARK CURRENT PULSE
X2:19	COMPOSITE BLANKING
X1:20	COMPOSITE SYNC
X1:17	CLAMP PULSE
X1:18	SAMPLE PULSE

Figure F2-6

WN17 POINTS	SIGNAL NAME
X1:18	SAMPLE PULSE
X1:17	CLAMP PULSE
X1:19	DISCHARGE PULSE
X2:19	COMPOSITE BLANKING
X2:20	DARK CURRENT RESET
X2:17	DARK CURRENT POWER ON

Figure F2-7

WN21 POINTS	SIGNAL NAME
X1:14	V-BLANKING
X1:6	H-BLANKING

Figure F2-8

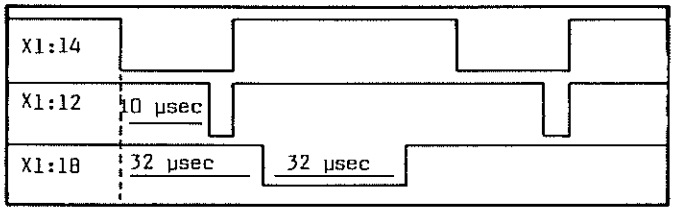
WN22 POINTS	SIGNAL NAME
X1:10	SAMPLE PULSE
X1:12	CLAMP PULSE
X1:16	DISCHARGE PULSE

LOOP F3: DOSE RATE CONTROL

De-energize CCU. Remove WN22 and replace on extender.
Position jumper switch W1 to connect points 1-2 and W2 to connect points 1-2.

Energize the CCU. Measure the line frequent pulses as shown in Figure F3-1.

Figure F3-1



Measurements same as Figure F3-1

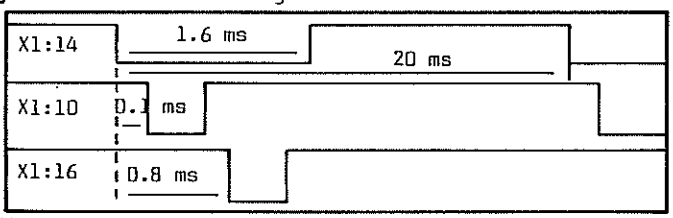
If point X1:14 is not correct, check the video processor in accordance with LOOP F5.

If point X1:12 is not correct, check the pulse generator in accordance with LOOP F2.

If point X1:18 is not correct, check the AGC/Id Board in accordance with LOOP F5.

Measure the frame frequent pulses as shown in Figure F3-2.

Figure F3-2



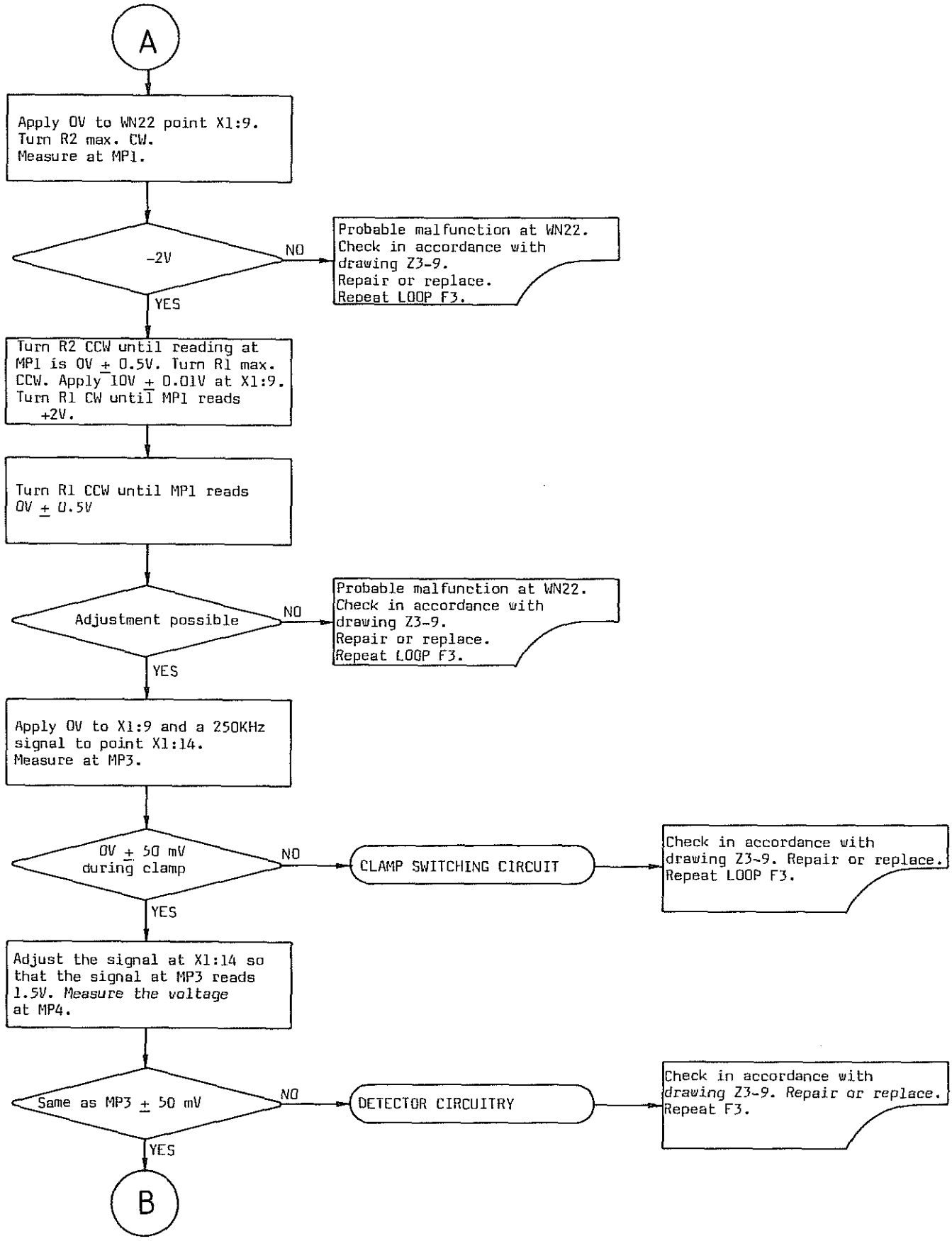
Measurements same as Figure F3-2.

If points X1:10 or X1:16 are not correct, check the pulse generator in accordance with LOOP F2.

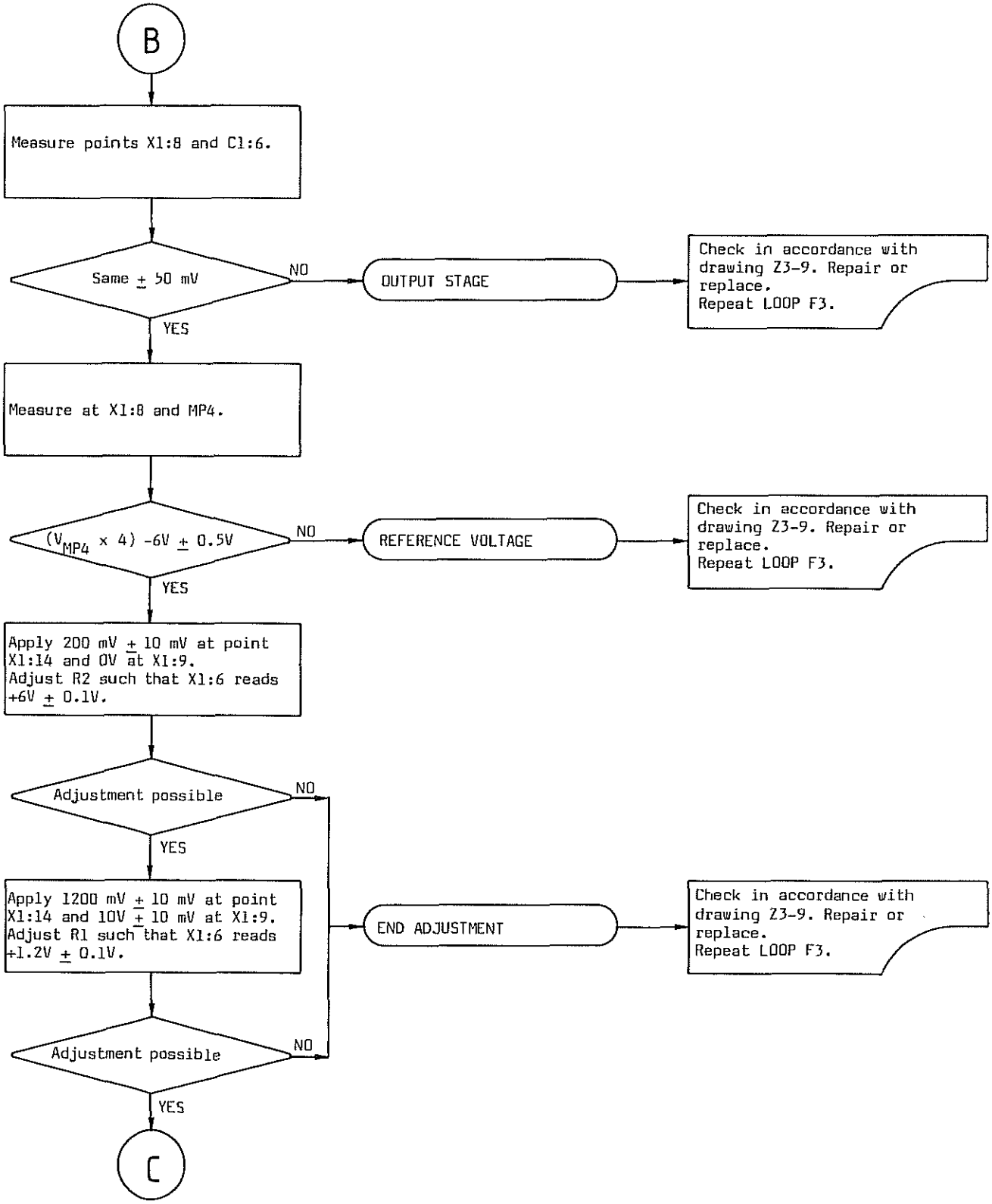
If point X1:14 is not correct, check the video processor in accordance with LOOP F5.

A

LOOP F3: DOSE RATE CONTROL (Cont.)



LOOP F3: DOSE RATE CONTROL (Cont.)


B
Measure points X1:8 and C1:6.
Same ± 50 mV
NO
OUTPUT STAGE
Check in accordance with drawing Z3-9. Repair or replace.
Repeat LOOP F3.
YES
Measure at X1:8 and MP4.
(V MP4 x 4) -6V ± 0.5V
NO
REFERENCE VOLTAGE
Check in accordance with drawing Z3-9. Repair or replace.
Repeat LOOP F3.
YES
Apply 200 mV ± 10 mV at point X1:14 and 0V at X1:9.
Adjust R2 such that X1:6 reads +6V ± 0.1V.
Adjustment possible
NO
YES
Apply 1200 mV ± 10 mV at point X1:14 and 10V ± 10 mV at X1:9.
Adjust R1 such that X1:6 reads +1.2V ± 0.1V.
END ADJUSTMENT
Check in accordance with drawing Z3-9. Repair or replace.
Repeat LOOP F3.
Adjustment possible
NO
YES
C

LOOP F3: DOSE RATE CONTROL (Cont.)

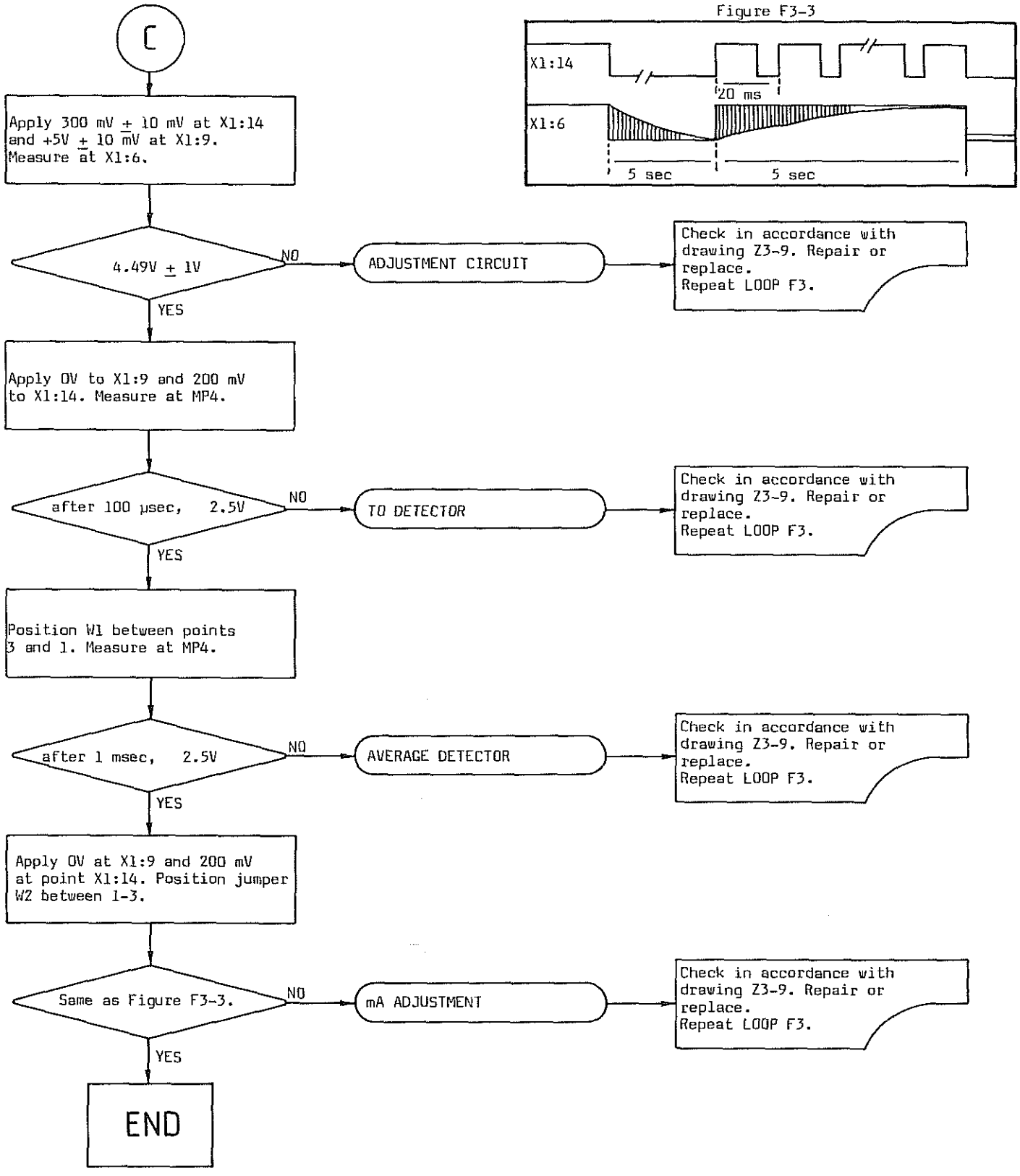
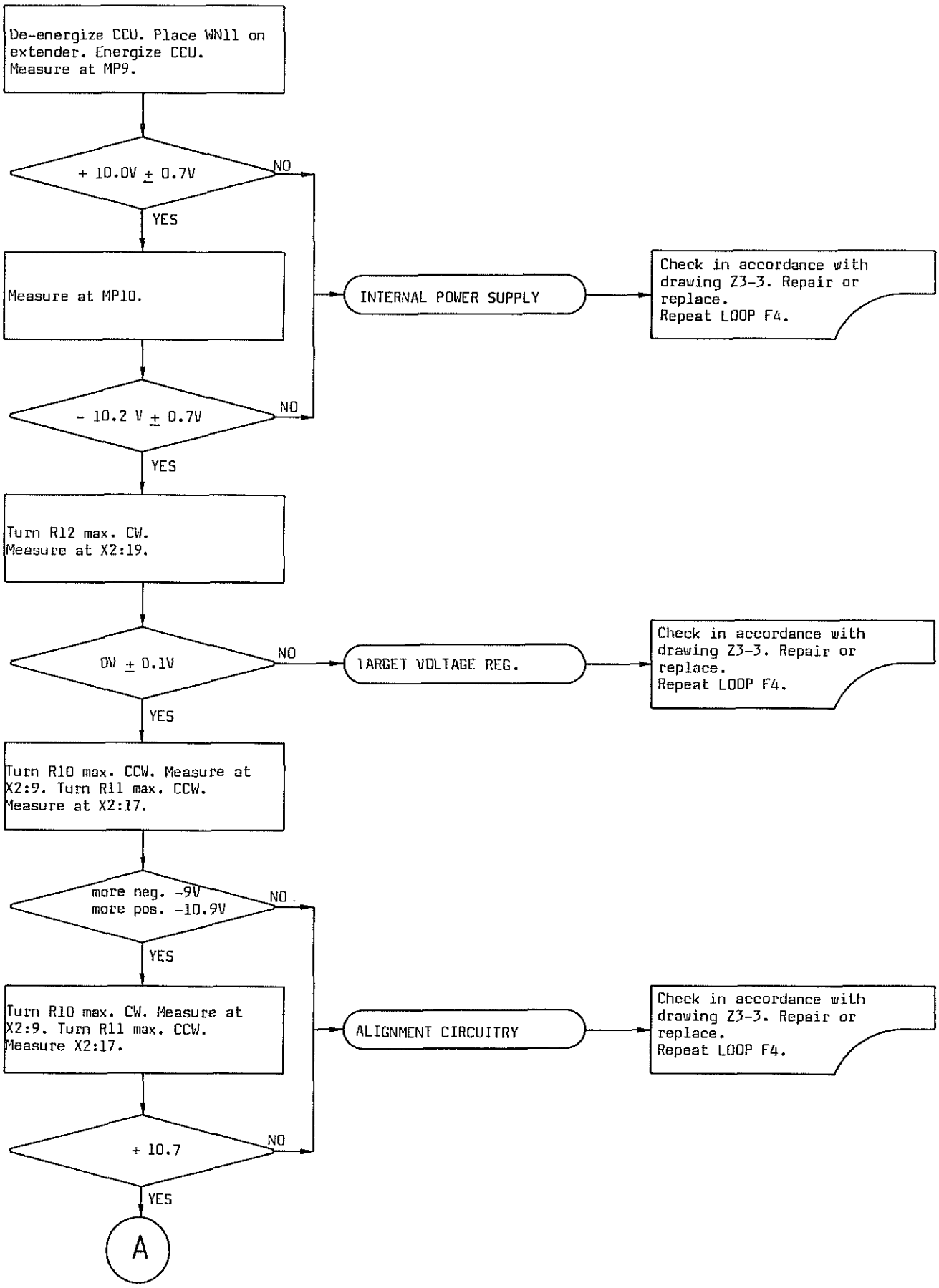

C
Apply 300 mV ± 10 mV at X1:14 and +5V ± 10 mV at X1:9. Measure at X1:6.
4.49V ± 1V
NO
ADJUSTMENT CIRCUIT
Check in accordance with drawing Z3-9. Repair or replace. Repeat LOOP F3.
YES
Apply 0V to X1:9 and 200 mV to X1:14. Measure at MP4.
after 100 µsec, 2.5V
NO
TO DETECTOR
Check in accordance with drawing Z3-9. Repair or replace. Repeat LOOP F3.
YES
Position W1 between points 3 and 1. Measure at MP4.
after 1 msec, 2.5V
NO
AVERAGE DETECTOR
Check in accordance with drawing Z3-9. Repair or replace. Repeat LOOP F3.
YES
Apply 0V at X1:9 and 200 mV at point X1:14. Position jumper W2 between 1-3.
Same as Figure F3-3.
NO
mA ADJUSTMENT
Check in accordance with drawing Z3-9. Repair or replace. Repeat LOOP F3.
YES
END

Figure F3-3

LOOP F4: CAMERA SUPPLY


De-energize CCU. Place WN11 on extender. Energize CCU. Measure at MP9.
+ 10.0V ± 0.7V
NO
YES
Measure at MP10.
INTERNAL POWER SUPPLY
Check in accordance with drawing Z3-3. Repair or replace. Repeat LOOP F4.
- 10.2 V ± 0.7V
NO
YES
Turn R12 max. CW. Measure at X2:19.
0V ± 0.1V
NO
TARGET VOLTAGE REG.
Check in accordance with drawing Z3-3. Repair or replace. Repeat LOOP F4.
YES
Turn R10 max. CCW. Measure at X2:9. Turn R11 max. CCW. Measure at X2:17.
more neg. -9V more pos. -10.9V
NO
YES
Turn R10 max. CW. Measure at X2:9. Turn R11 max. CCW. Measure X2:17.
ALIGNMENT CIRCUITRY
Check in accordance with drawing Z3-3. Repair or replace. Repeat LOOP F4.
+ 10.7
NO
YES
A

LOOP F4: CAMERA SUPPLY (Cont.)

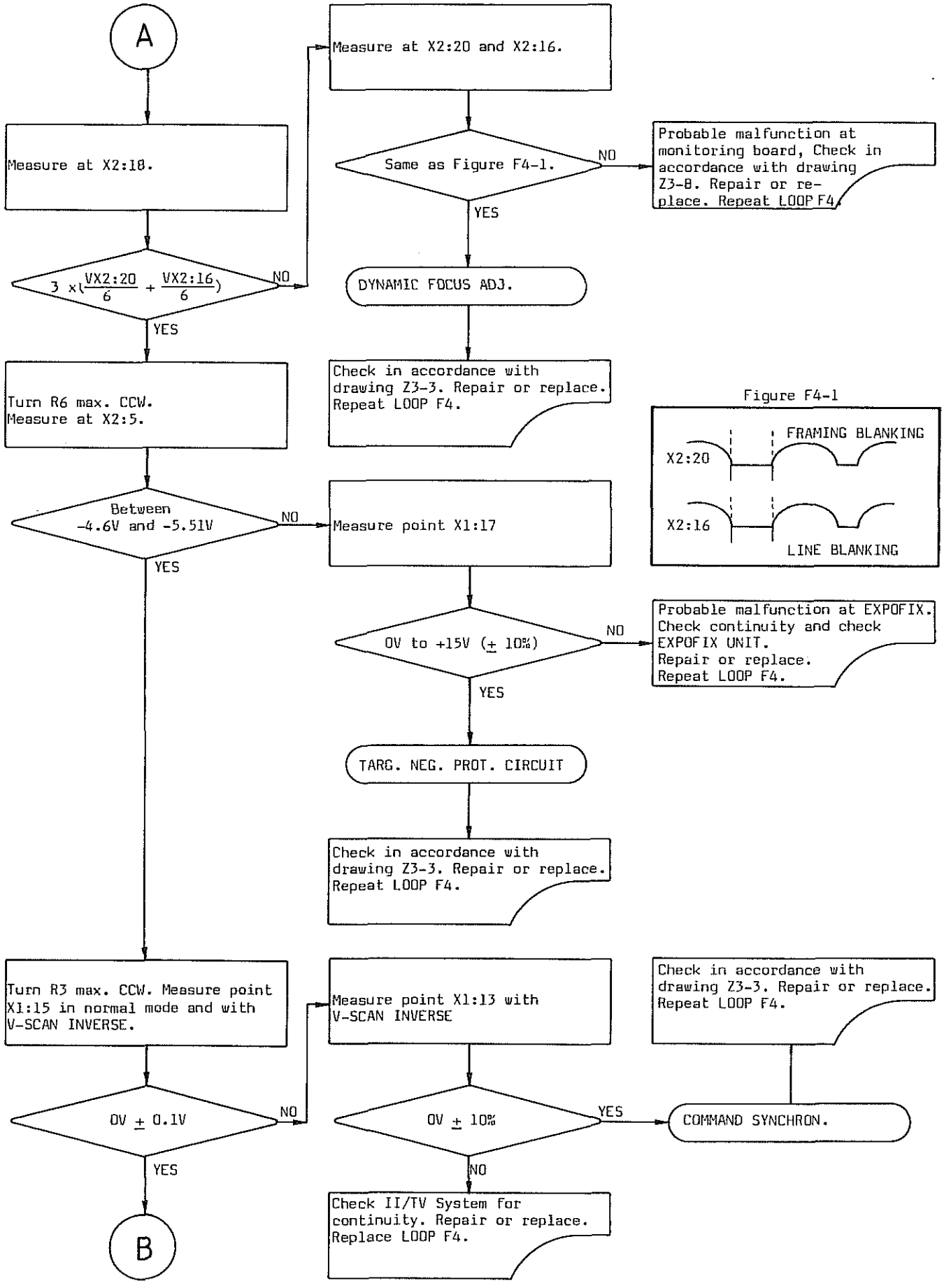
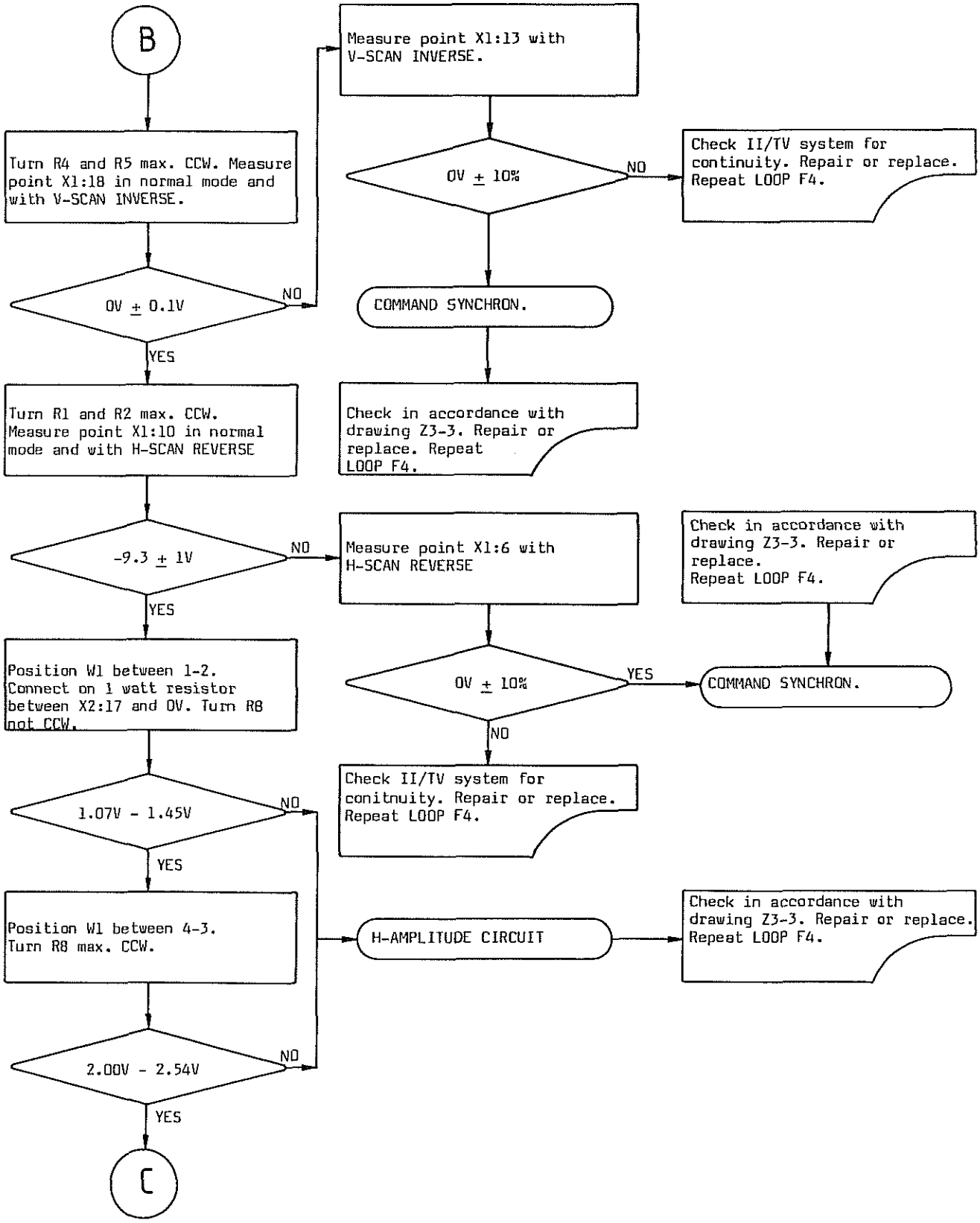
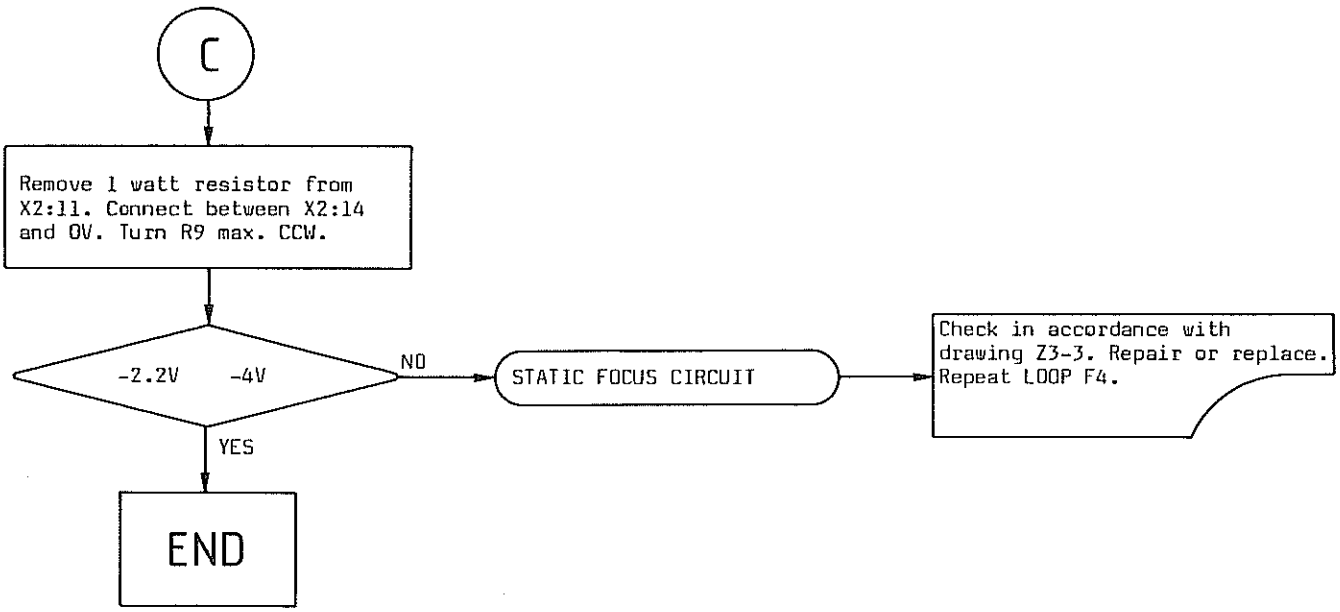

A
Measure at X2:18.
3 x(VX2:20/6 + VX2:16/6)
NO
YES
Turn R6 max. CCW.
Measure at X2:5.
Between -4.6V and -5.51V
NO
YES
Measure at X2:20 and X2:16.
Same as Figure F4-1.
NO
YES
Probable malfunction at monitoring board, Check in accordance with drawing Z3-8. Repair or replace. Repeat LOOP F4.
DYNAMIC FOCUS ADJ.
Check in accordance with drawing Z3-3. Repair or replace. Repeat LOOP F4.
Measure point X1:17
0V to +15V (± 10%)
NO
YES
Probable malfunction at EXPOFIX. Check continuity and check EXPOFIX UNIT. Repair or replace. Repeat LOOP F4.
TARG. NEG. PROT. CIRCUIT
Check in accordance with drawing Z3-3. Repair or replace. Repeat LOOP F4.
Turn R3 max. CCW. Measure point X1:15 in normal mode and with V-SCAN INVERSE.
0V ± 0.1V
NO
YES
Measure point X1:13 with V-SCAN INVERSE
0V ± 10%
YES
NO
Check in accordance with drawing Z3-3. Repair or replace. Repeat LOOP F4.
COMMAND SYNCHRON.
Check II/TV System for continuity. Repair or replace. Replace LOOP F4.
B

Figure F4-1

LOOP F4: CAMERA SUPPLY (Cont.)


B
Turn R4 and R5 max. CCW. Measure point X1:18 in normal mode and with V-SCAN INVERSE.
0V ± 0.1V
NO
YES
Measure point X1:13 with V-SCAN INVERSE.
0V ± 10%
NO
Check II/TV system for continuity. Repair or replace. Repeat LOOP F4.
COMMAND SYNCHRON.
Check in accordance with drawing Z3-3. Repair or replace. Repeat LOOP F4.
Turn R1 and R2 max. CCW. Measure point X1:10 in normal mode and with H-SCAN REVERSE
-9.3 ± 1V
NO
YES
Measure point X1:6 with H-SCAN REVERSE
Check in accordance with drawing Z3-3. Repair or replace. Repeat LOOP F4.
0V ± 10%
YES
NO
COMMAND SYNCHRON.
Check II/TV system for conitnuity. Repair or replace. Repeat LOOP F4.
Position W1 between 1-2. Connect on 1 watt resistor between X2:17 and 0V. Turn R8 not CCW.
1.07V - 1.45V
NO
YES
Position W1 between 4-3. Turn R8 max. CCW.
H-AMPLITUDE CIRCUIT
Check in accordance with drawing Z3-3. Repair or replace. Repeat LOOP F4.
2.00V - 2.54V
NO
YES
C

LOOP F4: CAMERA SUPPLY (Cont.)


C
Remove 1 watt resistor from X2:11. Connect between X2:14 and 0V. Turn R9 max. CCW.
-2.2V -4V
NO
STATIC FOCUS CIRCUIT
Check in accordance with drawing Z3-3. Repair or replace. Repeat LOOP F4.
YES
END

LOOP F5: VIDEO PROCESSING

De-energize CCU. Place WN13 on extender. Energzie CCU. Connect 75 Ohmn to plug WNX4. Measure sync. level at point X4:1.

NOTE

Before testing LOOP F5, complete testing LOOP F1 and LOOP F2.

top sync. 0V±0.01V voltage sync.-0.3V±0.05V — NO → SYNC MIXER → Check in accordance with drawing Z3-9. Repair or replace. Repeat LOOP F5.

YES

Measure video at X4:1. Adjust set-up to 35 mV ± 10% with R3 during CLEAN CIRCLE.

Adjust possible — NO → Measure at X1:6 during CLEAN CIRCLE → 0V ± 10% — NO → CLEAN CIRCLE CIRCUIT → Check in accordance with drawing Z3-4. Repair or replace. Repeat LOOP F5.

YES

0V ± 10% — YES → Check II/TV system for continuity. Repair or replace. Repeat LOOP F5.

Measure in accordance with Figure F5-1.

Same as Figure F5-1 — NO → Probable malfunction at AGC/Id board. Check in accordance with drawing Z3-5. Repair or replace. Repeat LOOP F5.

YES

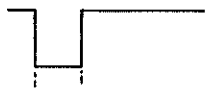
Apply 4V ± 0.05V at point X2:11. Measure at point X4:1 during dark current pulse.

310 mV ± 70 mV higher — NO → DARK CURRENT ADDING → Check in accordance with drawing Z3-4. Repair or replace. Repeat LOOP F5.

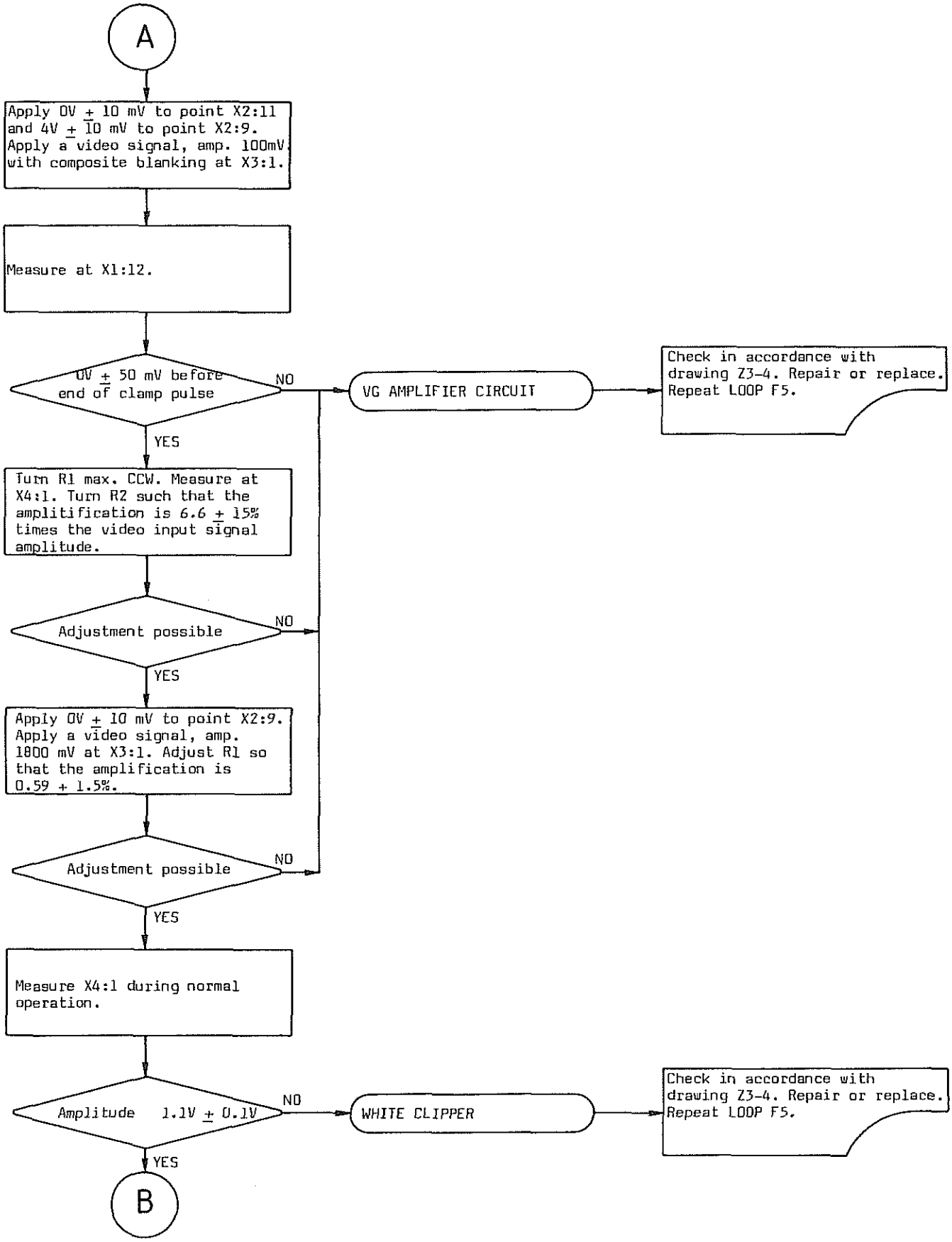
YES

A

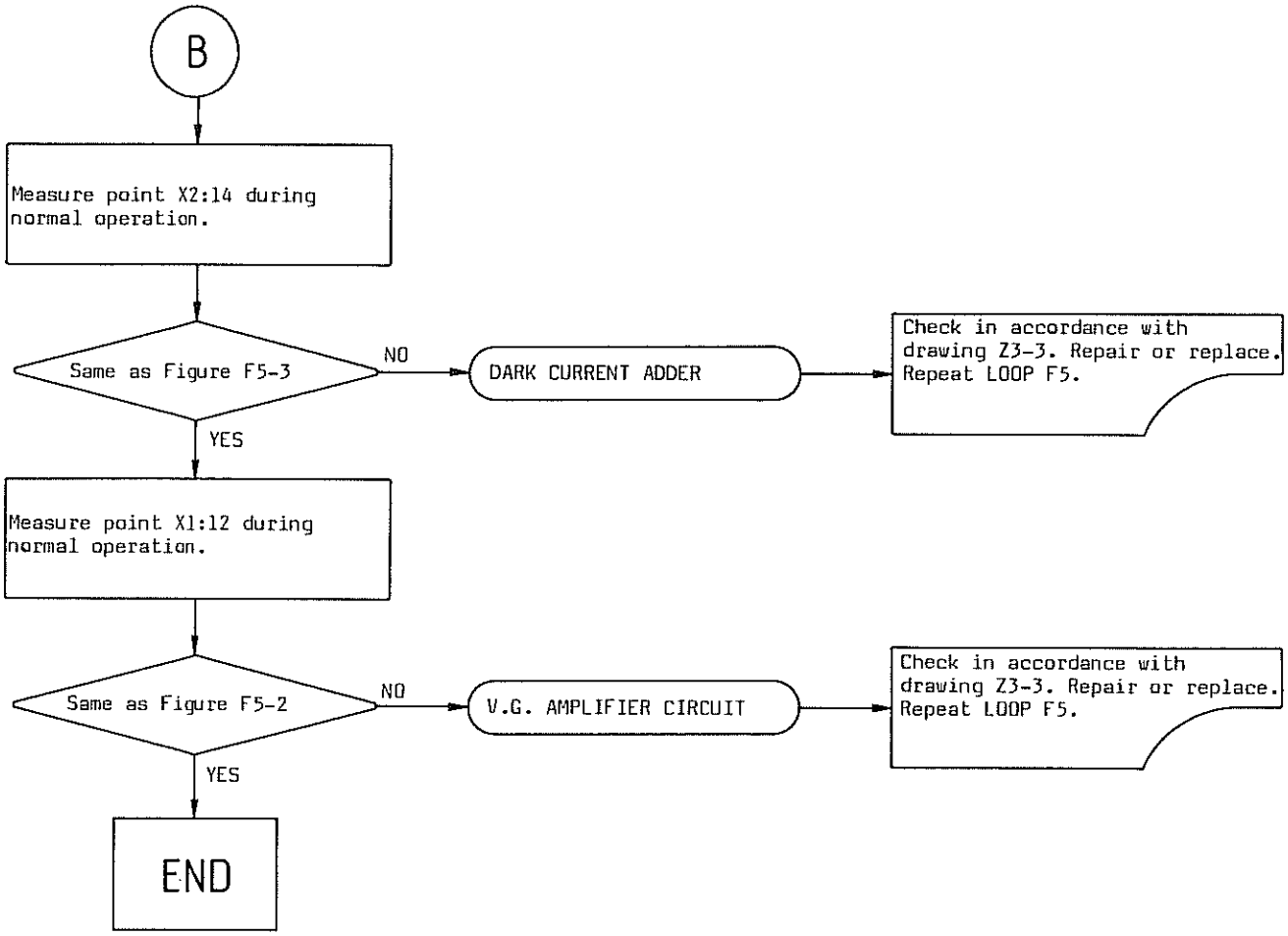
Figure F5-1

WN13 POINT	MEASUREMENT
X2:20	
X2:11	0V to + 4V (-0% ± 5%)
X2:9	0V to + 4V (-0% ± 5%)
X2:18	

LOOP F5: VIDEO PROCESSING (Cont.)


A
Apply 0V ± 10 mV to point X2:11 and 4V ± 10 mV to point X2:9. Apply a video signal, amp. 100mV with composite blanking at X3:1.
Measure at X1:12.
0V ± 50 mV before end of clamp pulse
NO
VG AMPLIFIER CIRCUIT
Check in accordance with drawing Z3-4. Repair or replace. Repeat LOOP F5.
YES
Turn R1 max. CCW. Measure at X4:1. Turn R2 such that the amplitification is 6.6 ± 15% times the video input signal amplitude.
Adjustment possible
NO
YES
Apply 0V ± 10 mV to point X2:9. Apply a video signal, amp. 1800 mV at X3:1. Adjust R1 so that the amplification is 0.59 ± 1.5%.
Adjustment possible
NO
YES
Measure X4:1 during normal operation.
Amplitude 1.1V ± 0.1V
NO
WHITE CLIPPER
Check in accordance with drawing Z3-4. Repair or replace. Repeat LOOP F5.
YES
B

LOOP F5: VIDEO PROCESSING (Cont.)


B
Measure point X2:14 during normal operation.
Same as Figure F5-3
NO
DARK CURRENT ADDER
Check in accordance with drawing Z3-3. Repair or replace. Repeat LOOP F5.
YES
Measure point X1:12 during normal operation.
Same as Figure F5-2
NO
V.G. AMPLIFIER CIRCUIT
Check in accordance with drawing Z3-3. Repair or replace. Repeat LOOP F5.
YES
END

Section Z: DRAWINGS

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SUPPLIED	Z1-3
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CAMERA CONTROL WN11	Z3-3
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AGC/Id WN17	Z3-5
PULSE GENERATOR WN19	Z3-6
MONITORING WN21	Z3-7
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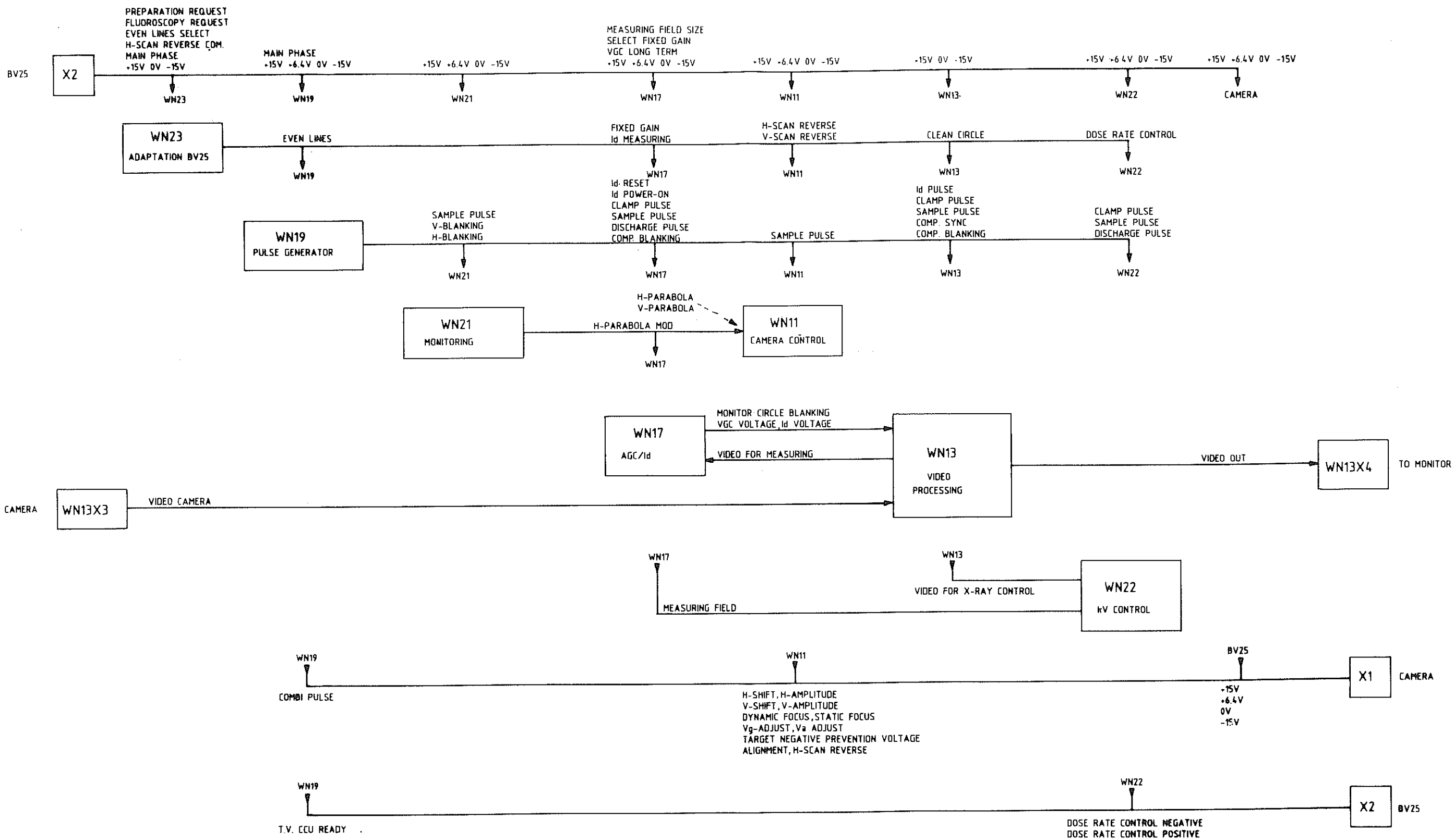
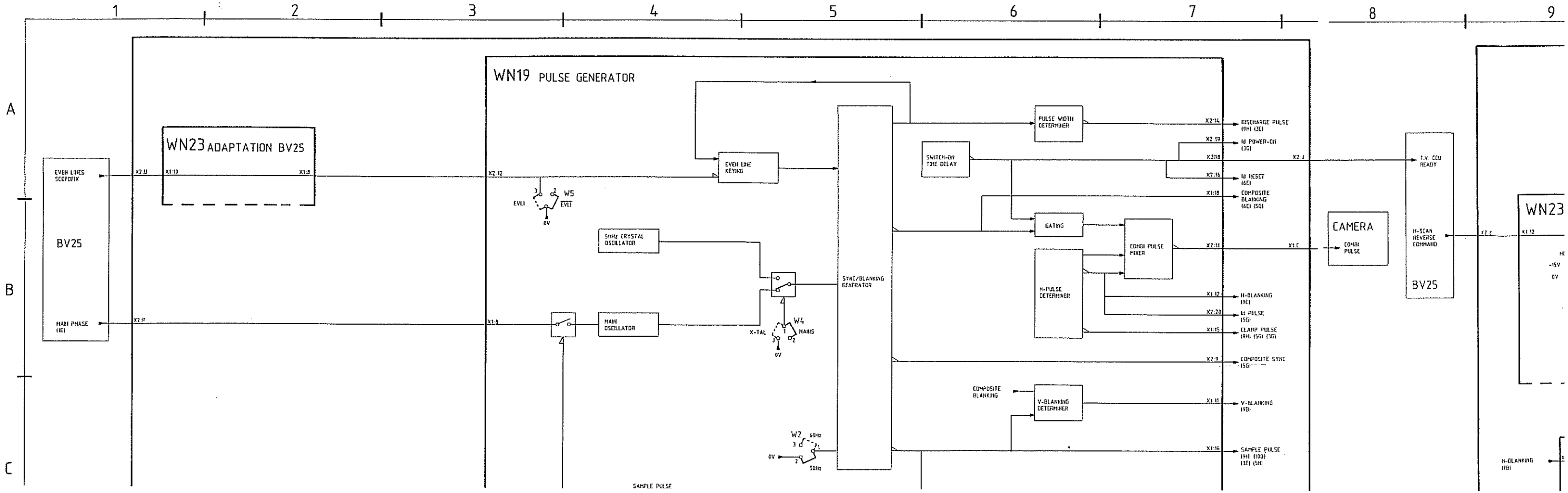
ADAPTATION BV25 WN23	Z3-9

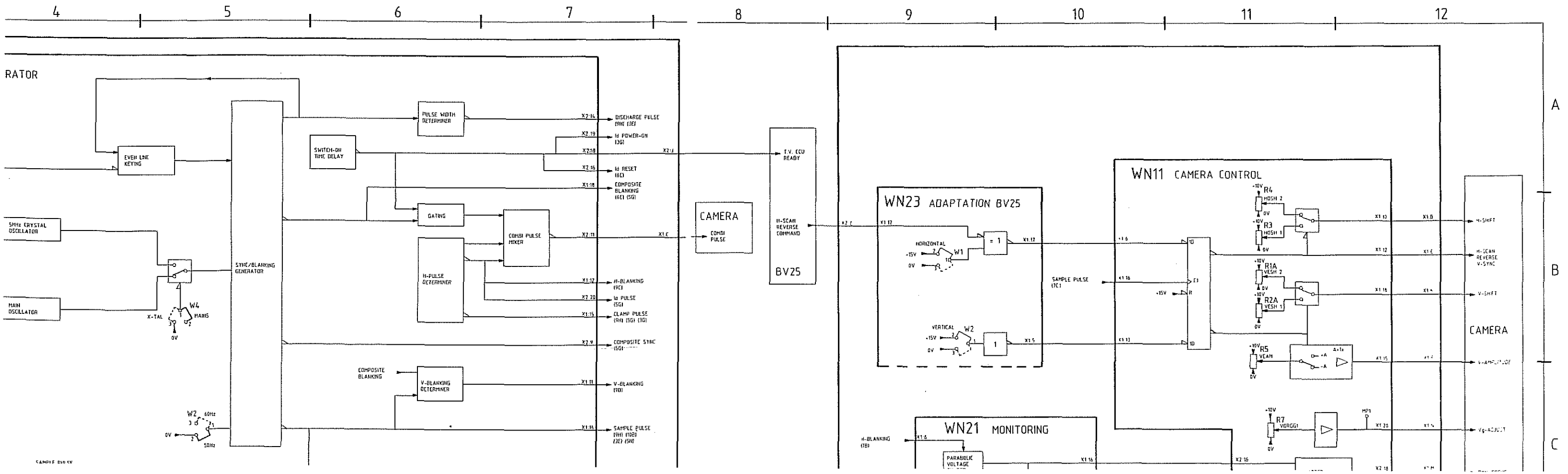


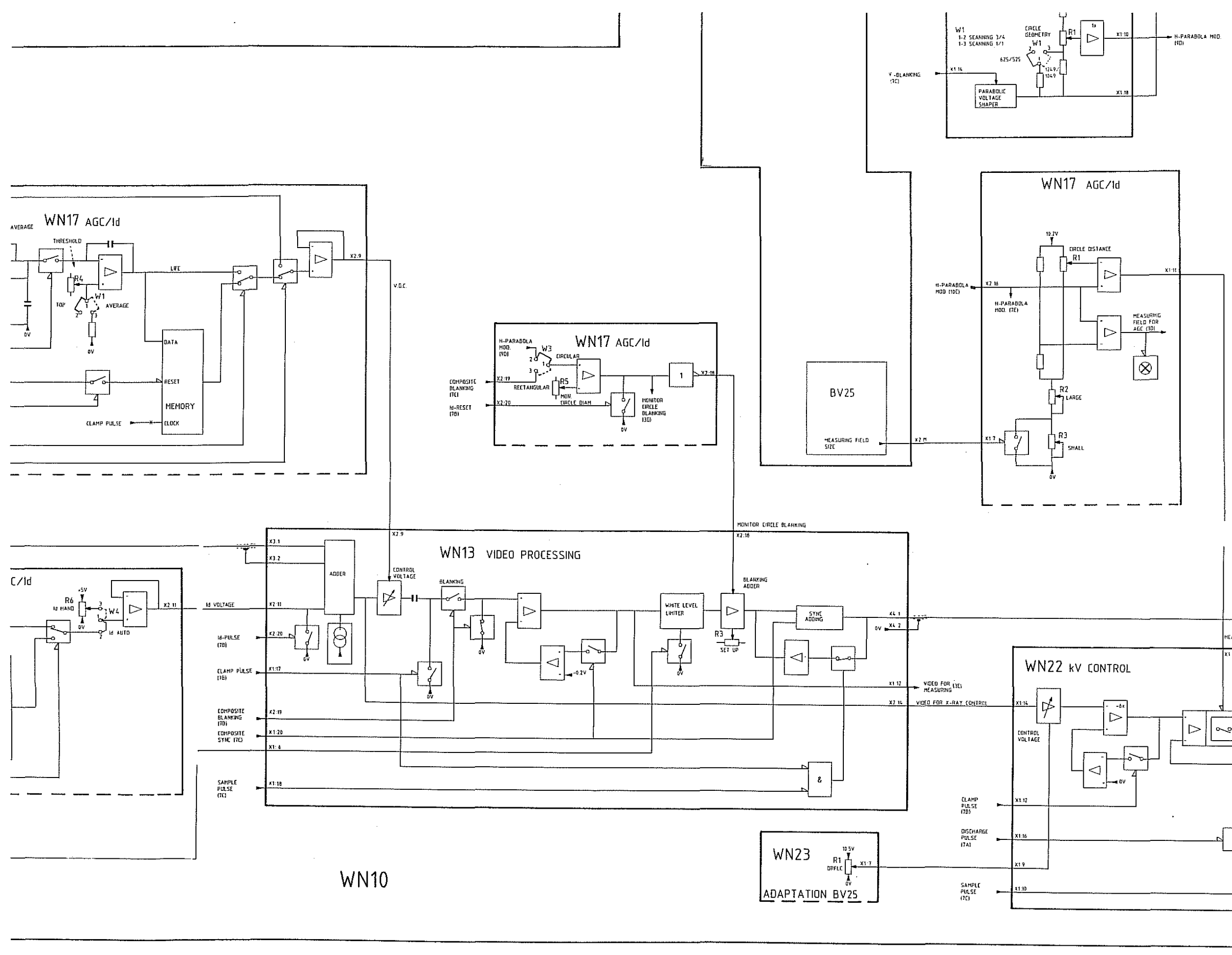
XTV5- FB TV Control Unit.

BLOCK DIAGRAM OF
T.V. CONTROL UNIT

WN


1
2
3
4
5
6
7
8
9
A
B
C
WN19 PULSE GENERATOR
WN23 ADAPTATION BV25
EVEN LINES SCOPOFIX
BV25
MAIN PHASE (6D)
X2:U
X1:10
X1:8
X2:P
X2:12
X1:A
EVEN LINE KEYING
EVLI
EVET
W5
0V
5MHz CRYSTAL OSCILLATOR
MAIN OSCILLATOR
X-TAL
MAINS
W4
SYNC/BLANKING GENERATOR
W2
60Hz
50Hz
SAMPLE PULSE
PULSE WIDTH DETERMINER
SWITCH-ON TIME DELAY
GATING
COMBI PULSE MIXER
H-PULSE DETERMINER
COMPOSITE BLANKING
V-BLANKING DETERMINER
X2:14
X2:19
X2:18
X2:16
X1:18
X2:11
X1:12
X2:20
X1:15
X2:9
X1:11
X1:14
DISCHARGE PULSE (9H) (3E)
M POWER-ON (3G)
M RESET (6E)
COMPOSITE BLANKING (6E) (5G)
H-BLANKING (9C)
M PULSE (5G)
CLAMP PULSE (9H) (5G) (3D)
COMPOSITE SYNC (5G)
V-BLANKING (9D)
SAMPLE PULSE (9H) (10B) (3E) (5H)
X2:J
X1:C
CAMERA
COMBI PULSE
T.V. CCU READY
H-SCAN REVERSE COMMAND
BV25
WN23
X2:C
X1:12
+15V
0V
H-BLANKING (7B)


4
5
6
7
8
9
10
11
12
A
B
C
RATOR
EVEN LINE KEYING
5MHz CRYSTAL OSCILLATOR
MAIN OSCILLATOR
X-TAL
W4
MAINS
0V
SYNC/BLANKING GENERATOR
W2
60Hz
50Hz
SWITCH-ON TIME DELAY
PULSE WIDTH DETERMINER
GATING
COMBI PULSE MIXER
H-PULSE DETERMINER
COMPOSITE BLANKING
V-BLANKING DETERMINER
X2.14
DISCHARGE PULSE (9H) (3E)
X2.19
Id POWER-ON (3G)
X2.18
X2.4
X2.16
Id RESET (6E)
X1.18
COMPOSITE BLANKING (6E) (5G)
X2.11
X1.C
X1.17
H-BLANKING (9C)
X2.20
Id PULSE (5G)
X1.15
CLAMP PULSE (9H) (5G) (3G)
X2.9
COMPOSITE SYNC (5G)
X1.11
V-BLANKING (10D)
X1.14
SAMPLE PULSE (9H) (10B) (3E) (5H)
CAMERA
COMBI PULSE
T.V. ECO READY
H-SCAN REVERSE COMMAND
BV25
X2.C
WN23 ADAPTATION BV25
X1.17
HORIZONTAL
W1
-15V
0V
= 1
VERTICAL
W2
1
X1.5
SAMPLE PULSE (7C)
X1.16
X1.13
WN11 CAMERA CONTROL
+10V
R4
HOSH 2
R3
HOSH 1
R1A
VESH 2
R2A
VESH 1
R5
VEAM
R7
VGRGG1
+15V
+A
-A
MP3
X1.B
X1.12
X1.E
X1.18
X1.A
X1.15
X1.4
X1.20
X1.K
H-SHIFT
H-SCAN REVERSE V-SYNC
V-SHIFT
CAMERA
V-AMPLITUDE
Vg-ADJUST
WN21 MONITORING
H-BLANKING (7B)
X1.6
PARABOLIC VOLTAGE
X1.16
X2.16
X2.18



SIMPLIFIED CIRCUIT DIAGRAM
OF T.V. CONTROL UNIT

WN

Section Z

XTV5- FB TV Control Unit

D

E

F

G

H

WN23 ADAPTATION BV25

+5V
R2
FXGN
X1:4
0V

WN17 AGC/Id

MEASURING FIELD FOR AGC (10E)
0V
W2
3 AVERAGE
TOP
THRESHOLD
VIDEO FOR MEASURING (9G)
X1:12
VIDEO FOR MEASURING (3G)
DISCHARGE PULSE (7A)
X1:19
DISCHARGE PULSE (3G)
R4
W1
TOP
AVERAGE
SAMPLE PULSE (7C)
X1:18
DATA
RESET
MEMORY
CLAMP PULSE
CLOCK
LIFE
X2:9
V.G.C.
X2:5
X1:6
X2:13

VGC LONG TERM
BV25
SELECT FIXED GAIN
X2:A
X2:D

H-PARABOLA MOD. (9D)
W3
CIRCULAR
RECTANGULAR
COMPOSITE BLANKING (7C)
X2:19
Id-RESET (7D)
X2:20
R5
MAN. CIRCLE DIAM.
MONITOR CIRCLE BLANKING (3G)
0V
1
X2:18

V-BLANKING (7C)
BV25
MEASURING FIELD SIZE
X2:M

CAMERA
VIDEO CAMERA

WN17 AGC/Id

R7
Id AUTO
VIDEO FOR MEASURING (3E)
MONITOR CIRCLE BLANKING (7E)
0V
DISCHARGE PULSE (3E)
DATA
RESET
MEMORY
CLOCK
Id POWER-ON (7A)
CLAMP PULSE (7B)
CLAMP PULSE (4F)
X2:17
X1:17
X2:12
LIFE
R6
Id HAND
+5V
W4
Id AUTO
X2:11

WN23 ADAPTATION BV25

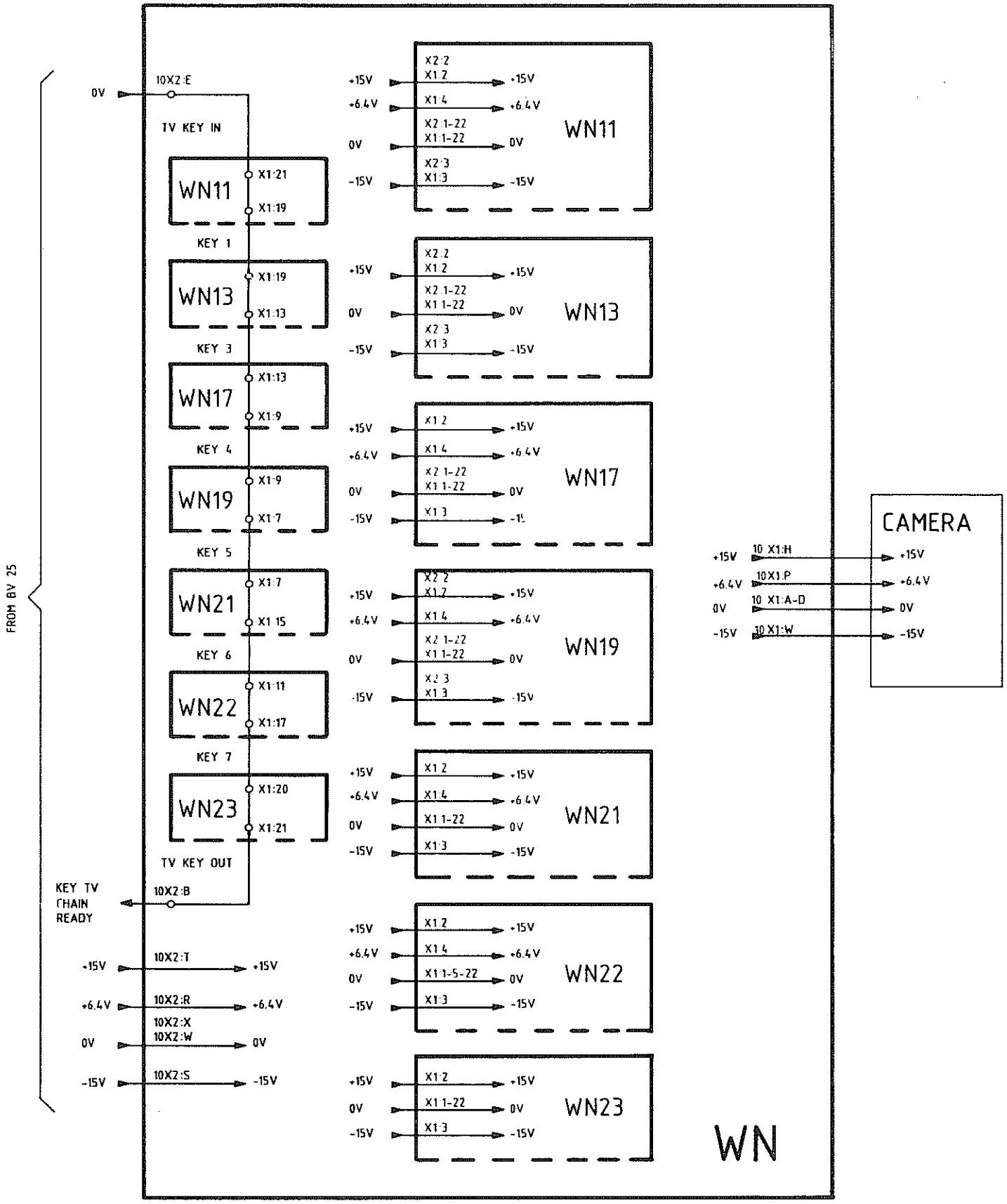
BV25
MAIN PHASE (9B)
PREPARATION REQUEST
REQUEST STAND FLUOROSCOPY
X2:P
X2:K
X2:N
X1:10
X1:9
X1:16
PULSE SHAPER
≥ 1
30 S
END
1
X1:19
X1:6
Id MEASURING
CLEAN CIRCLE COMMAND

WN13 VIDEO PROCESSING

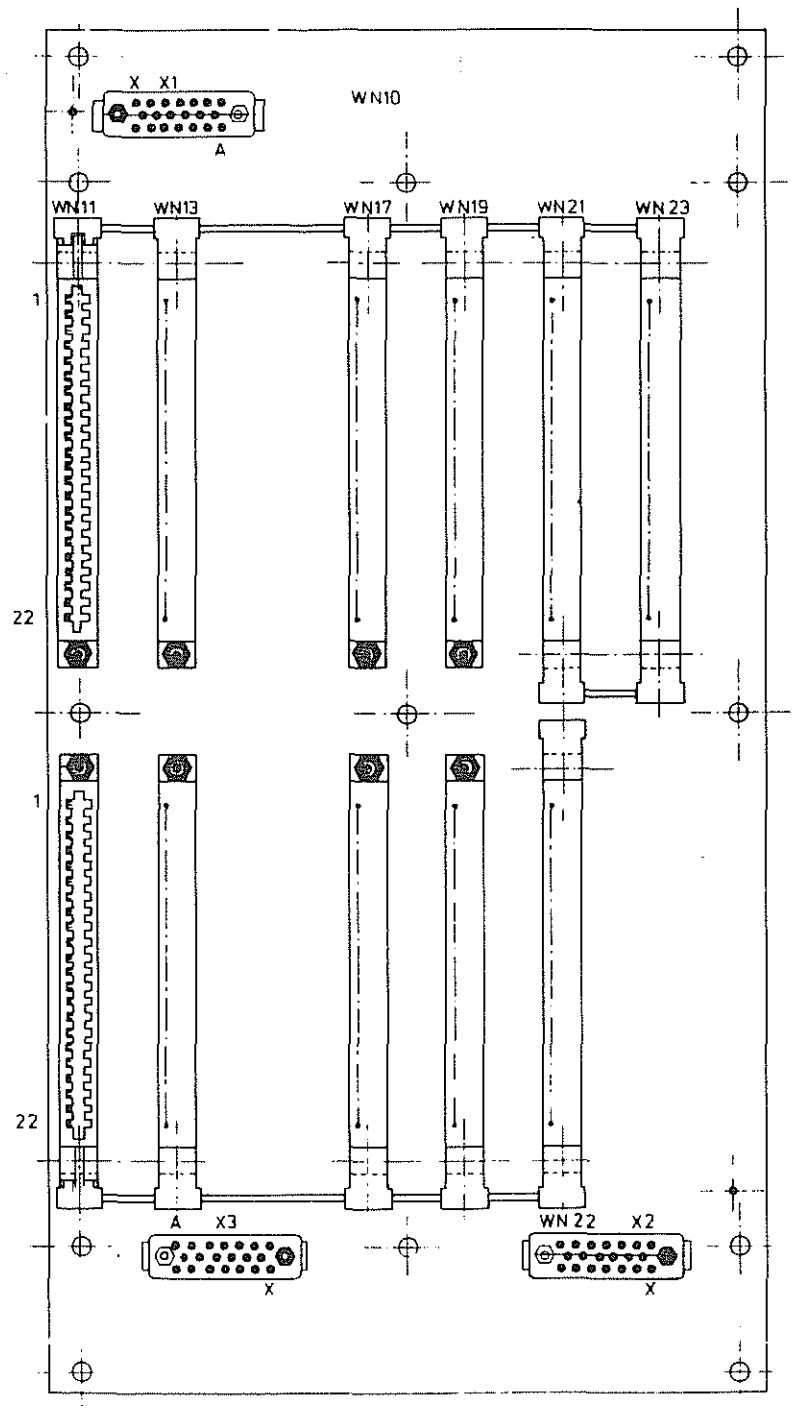
X3:1
X3:2
ADDER
CONTROL VOLTAGE
BLANKING
BLANKING ADDER
WHITE LEVEL LIMITER
SYNC ADDING
R3
SET UP
-0.2V
0V
MONITOR CIRCLE BLANKING
X2:9
X2:18
X4:1
X4:2
X1:12
X2:14
VIDEO MEASL
VIDEO FB
Id VOLTAGE
X2:11
Id-PULSE (7B)
X2:20
CLAMP PULSE (7B)
X1:17
COMPOSITE BLANKING (7B)
X2:19
COMPOSITE SYNC (7C)
X1:20
X1:6
SAMPLE PULSE (7C)
X1:18
&

WN10

WN23
10.5V
R1
ORFLE
X1:7
0V
ADAPTATION BV25


FROM BV 25
0V
10X2:E
TV KEY IN
WN11
X1:21
X1:19
KEY 1
WN13
X1:19
X1:13
KEY 3
WN17
X1:13
X1:9
KEY 4
WN19
X1:9
X1:7
KEY 5
WN21
X1:7
X1:15
KEY 6
WN22
X1:11
X1:17
KEY 7
WN23
X1:20
X1:21
TV KEY OUT
KEY TV CHAIN READY
10X2:B
+15V
10X2:T
+15V
+6.4V
10X2:R
+6.4V
10X2:X
10X2:W
0V
0V
-15V
10X2:S
-15V
WN11
X2:2
X1:2
+15V
+6.4V
X1:4
X2:1-22
X1:1-22
0V
X2:3
X1:3
-15V
WN13
WN17
WN19
WN21
WN22
WN23
CAMERA
10 X1:H
10X1:P
10 X1:A-D
10X1:W
WN

SUPPLIES WN



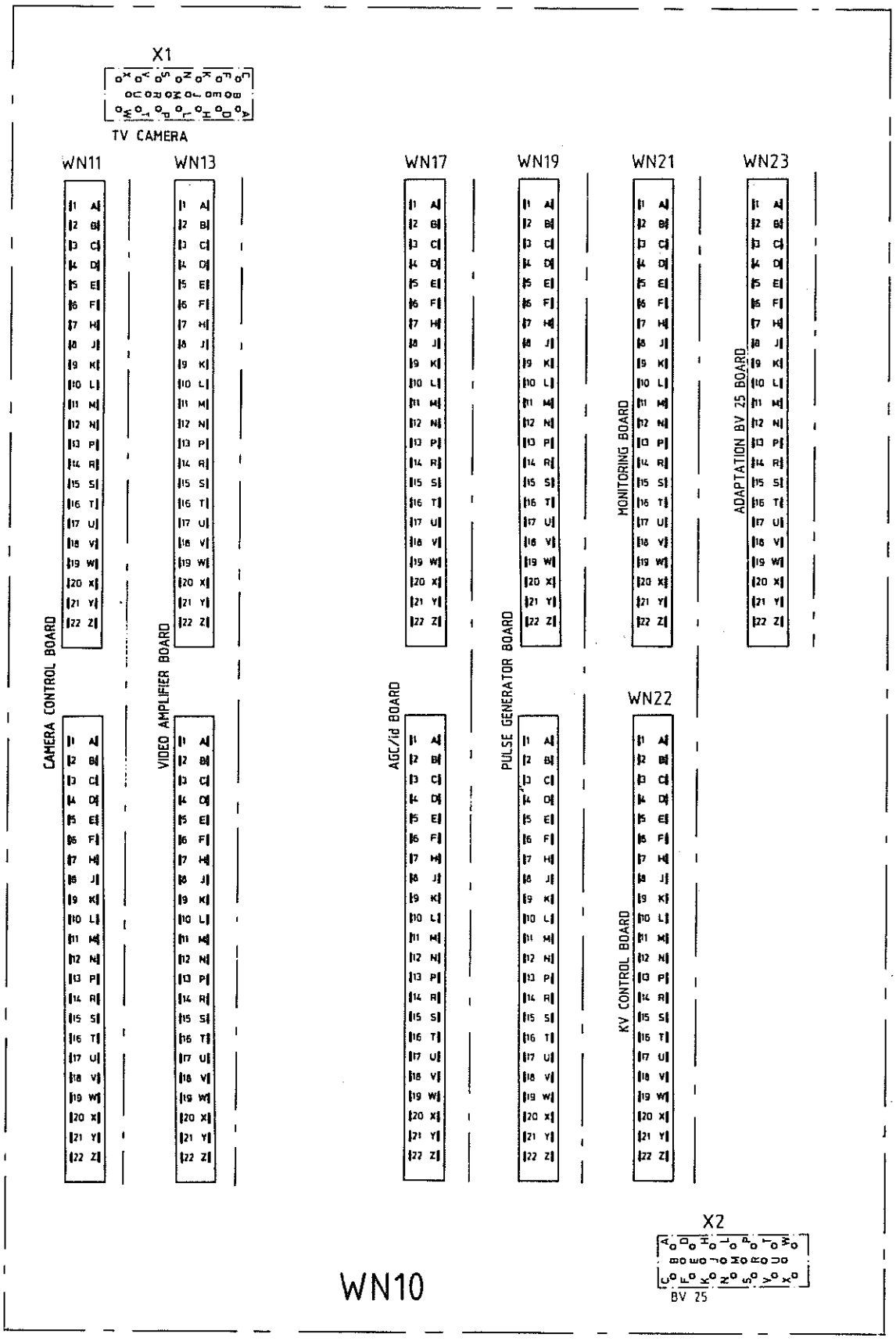
WN10X1:A	0V	WN11X1:15	VFAM	WN17X1:9	KY4
WN10X1:B	HOSH	WN11X1:16	SAPU	WN17X1:11	RFKV
WN10X1:C	CBPU	WN11X1:18	VFSH	WN17X1:12	VIRF
WN10X1:D	0V	WN11X1:19	KY1	WN17X1:13	KY3
WN10X1:E	SRHOVSLC	WN11X1:20	VORGG1	WN17X1:17	CPPU
WN10X1:F	VFAM	WN11X1:21	TVKYIN	WN17X1:18	SAPU
WN10X1:H	+15V	WN11X1:22	0V	WN17X1:19	DSPU
WN10X1:J	TAVORG	WN11X2:1	0V	WN17X1:22	0V
WN10X1:K	VFSH	WN11X2:2	+15V	WN17X2:1	0V
WN10X1:M	OVFCRG	WN11X2:3	-15V	WN17X2:2	+15V
WN10X1:N	VORGG1	WN11X2:5	TANGPV0	WN17X2:3	-15V
WN10X1:P	+6,4V	WN11X2:9	ALOIRG	WN17X2:5	FKGN---A
WN10X1:R	HOAM	WN11X2:11	HOAM	WN17X2:9	AGVD
WN10X1:S	TANGPV0	WN11X2:14	STFC	WN17X2:11	DACUVO
WN10X1:U	STFC	WN11X2:16	LIPR	WN17X2:12	DACUMELC
WN10X1:V	ALOIRG	WN11X2:17	ALOORG	WN17X2:13	SLFXGNLC
WN10X1:W	-15V	WN11X2:18	OVFCRG	WN17X2:15	CLCL--LC
WN10X1:X	ALO2RG	WN11X2:19	TAVORG	WN17X2:16	LIPBRD
WN10X1:A	AGLOLTLC	WN11X2:20	FRPR	WN17X2:17	DACUPO
WN10X2:B	TVKYOT	WN11X2:22	0V	WN17X2:18	CBBK
WN10X2:C	SRHOOCLC	WN13X1:1	0V	WN17X2:19	CORK
WN10X2:D	SLFXGNLC	WN13X1:2	+15V	WN17X2:20	DACURS
WN10X2:E	TVKYIN	WN13X1:3	-15V	WN17X2:22	0V
WN10X2:F	DRFLOFNA	WN13X1:4	+6,4V	WN19X1:1	0V
WN10X2:H	DRFLOFPA	WN13X1:6	CLCL--LC	WN19X1:2	+15V
WN10X2:J	CUTVROLC	WN13X1:12	VIME	WN19X1:3	-15V
WN10X2:K	PRRO--LC	WN13X1:13	KY3	WN19X1:4	+6,4V
WN10X2:L	SRVEOCLC	WN13X1:17	CPPU	WN19X1:7	KY5
WN10X2:M	VFSH---LC	WN13X1:18	SAPU	WN19X1:8	RRPH---A
WN10X2:N	RQSTPLLC	WN13X1:19	KY1	WN19X1:19	KY4
WN10X2:P	MNPH---A	WN13X1:20	COSN	WN19X1:11	FRBK
WN10X2:R	+6,4V	WN13X1:22	0V	WN19X1:12	LIBK
WN10X2:S	-15V	WN13X2:1	0V	WN19X1:15	LPPU
WN10X2:T	+15V	WN13X2:2	+15V	WN19X1:16	SAPU
WN10X2:U	EVLI--FN	WN13X2:3	-15V	WN19X1:18	COBK
WN10X2:V	+6,4V	WN13X2:9	AGVD	WN19X1:22	0V
WN10X2:W	0V	WN13X2:11	DACUVO	WN19X2:1	0V
WN10X2:X	0V	WN13X2:14	VIKV	WN19X2:2	+15V
WN10X3:A	SLFTFSLC	WN13X2:18	CLBK	WN19X2:3	-15V
WN10X3:B	FTFSC	WN13X2:19	CORK	WN19X2:9	COSN
WN10X3:D	LIFRO-LC	WN13X2:20	DACUPU	WN19X2:11	CBPU
WN10X3:H	FTORC	WN13X2:22	0V	WN19X2:12	EVLI--LC
WN11X1:1	0V	WN17X1:1	0V	WN19X2:14	DSPU
WN11X1:2	+15V	WN17X1:2	+15V	WN19X2:16	DACURS
WN11X1:3	-15V	WN17X1:3	-15V	WN19X2:18	CUTVROLC
WN11X1:4	+6,4V	WN17X1:4	+6,4V	WN19X2:19	DACUPO
WN11X1:6	SRHO--LC	WN17X1:5	SLFTFSLC	WN19X2:20	DACUPU
WN11X1:10	HOSH	WN17X1:6	AGLOLTLC	WN19X2:22	0V
WN11X1:12	SRHOVSLC	WN17X1:7	RFSH---LC	WN21X1:1	0V
WN11X1:13	SRVE--LC	WN17X1:8	FTFSC	WN21X1:2	+15V

WN21X1:3	-15V				
WN21X1:4	+6,4V				
WN21X1:6	LIBK				
WN21X1:7	KY5				
WN21X1:10	LIPBRD				
WN21X1:14	FRBK				
WN21X1:15	KY6				
WN21X1:16	LIPR				
WN21X1:18	FRPR				
WN21X1:22	0V				
WN22X1:1	0V				
WN22X1:2	+15V				
WN22X1:3	-15V				
WN22X1:4	+6,4V				
WN22X1:6	DRFLOFPA				
WN22X1:8	DRFLOFNA				
WN22X1:9	DRFLC				
WN22X1:10	SAPU				
WN22X1:11	KY6				
WN22X1:12	CPPU				
WN22X1:14	VIKV				
WN22X1:16	DSPU				
WN22X1:17	KY7				
WN22X1:19	RRKV				
WN22X1:22	0V				
WN23X1:1	0V				
WN23X1:2	+15V				
WN23X1:3	-15V				
WN23X1:4	FKGN---A				
WN23X1:5	SRVE--LC				
WN23X1:6	CLCL--LC				
WN23X1:7	DRFLC				
WN23X1:8	EVLI--LC				
WN23X1:9	PRRO--LC				
WN23X1:10	EVLI--FN				
WN23X1:11	LIFRO-LC				
WN23X1:12	SRHOOCLC				
WN23X1:13	FTORC				
WN23X1:14	SRVEOCLC				
WN23X1:16	RQSTPLLC				
WN23X1:17	SRHO--LC				
WN23X1:18	MNPH---A				
WN23X1:19	DACUMELC				
WN23X1:20	KY7				
WN23X1:21	TVKYOT				
WN23X1:22	0V				

+15V	WN11X1:2	- WN11X2:2	- WN13X1:2	- WN13X2:2	
	- WN17X1:2	- WN17X2:2	- WN19X1:2	- WN19X2:2	
	- WN21X1:2	- WN22X1:2	- WN23X1:2	- WN10X1:M	
	- WN10X2:T				
+6,4V	WN11X1:4	- WN13X1:4	- WN17X1:4	- WN19X1:4	
	- WN21X1:4	- WN22X1:4	- WN13X1:P	- WN10X1:R	
	- WN10X2:V				
-15V	WN11X1:3	- WN11X2:3	- WN13X1:3	- WN13X2:3	
	- WN17X1:3	- WN17X2:3	- WN19X1:3	- WN19X2:3	
	- WN21X1:3	- WN22X1:3	- WN23X1:3	- WN10X1:W	
	- WN10X2:S				
AGLOLTLC	WN17X1:A	- WN13X2:A			
AGVD	WN13X2:9	- WN17X2:9			
ALOIRG	WN11X2:9	- WN10X1:V			
ALO2RG	WN11X2:17	- WN10X1:X			
CBPU	WN19X2:11	- WN10X1:C			
CLBK	WN13X2:18	- WN17X2:18			
CLCL--LC	WN13X1:6	- WN23X1:6	- WN17X2:15		
CORK	WN13X2:19	- WN17X2:19	- WN19X1:18		
COSN	WN13X1:20	- WN19X2:9			
CPPU	WN13X1:17	- WN17X1:17	- WN19X1:15	- WN22X1:12	
CUTVROLC	WN19X2:18	- WN10X2:J			
DACUMELC	WN17X2:12	- WN23X1:19			
DACUPO	WN17X2:17	- WN19X2:18			
DACUPU	WN13X2:20	- WN19X2:20			
DACURS	WN17X2:20	- WN19X2:16			
DACUVO	WN13X2:11	- WN17X2:11			
DRFLC	WN22X1:9	- WN23X1:7			
DRFLOFNA	WN22X1:8	- WN10X2:F			
DRFLOFPA	WN22X1:6	- WN10X2:H			
DSPU	WN17X1:19	- WN19X2:14	- WN22X1:16		
OVFCRG	WN11X2:18	- WN10X1:M			
FTORC	WN23X1:13	- WN10X3:H			
FTFSC	WN17X1:8	- WN10X3:B			
EVLI--FN	WN23X1:10	- WN10X2:U			
EVLI--LC	WN19X2:12	- WN23X1:8			
FRBK	WN19X1:11	- WN21X1:14			
FRPR	WN21X2:20	- WN21X1:18			
FKGN---A	WN17X2:5	- WN23X1:4			
HOAM	WN11X2:11	- WN10X1:R			
HOSH	WN11X1:10	- WN10X1:B			
LIFRO-LC	WN23X1:11	- WN10X3:D			
KY1	WN11X1:19	- WN13X1:19			
KY3	WN13X1:13	- WN17X1:13			
KY4	WN17X1:9	- WN19X1:19			
KY5	WN19X1:7	- WN21X1:7			
KY6	WN21X1:15	- WN22X1:11			
KY7	WN22X1:17	- WN23X1:20			
LIBK	WN19X1:12	- WN21X1:6			
LIPR	WN13X2:16	- WN21X1:16			
LIPBRD	WN17X2:16	- WN21X1:10			
RFKV	WN17X1:11	- WN22X1:18			
RFSH---LC	WN17X1:7	- WN13X2:R			
RRPH---A	WN19X1:8	- WN23X1:18	- WN13X2:P		
PRRO--LC	WN23X1:9	- WN10X2:K			

RQSTPLLC	WN23X1:16	- WN10X2:N			
SAPU	WN21X2:6	- WN17X1:18	- WN17X2:18	- WN19X1:16	
	- WN22X1:10				
SLFTFSLC	WN17X1:5	- WN13X2:A			
SLFXGNLC	WN17X2:13	- WN13X2:D			
SRHO---LC	WN11X1:6	- WN23X1:17			
SRHOOCLC	WN23X1:12	- WN13X2:C			
SRHOVSLC	WN11X1:12	- WN10X1:F			
SRVE--LC	WN11X1:13	- WN23X1:5			
SRVEOCLC	WN23X1:14	- WN10X2:L			
STFC	WN11X2:14	- WN13X1:2L			
TANGPV0	WN11X2:15	- WN13X1:S			
TAVORG	WN11X2:19	- WN13X1:J			
TVKYIN	WN11X1:21	- WN13X2:E			
TVKYOT	WN23X1:21	- WN13X2:U			
VFAM	WN11X1:15	- WN10X1:F			
VFSH	WN11X1:18	- WN10X1:K			
VIKV	WN13X2:14	- WN22X1:14			
VIME	WN13X1:12	- WN17X1:12			
VORGG1	WN11X1:20	- WN10X1:N			
0V	WN11X1:1	- WN11X1:22	- WN11X2:21	- WN11X2:22	
	- WN13X1:1	- WN13X1:22	- WN13X2:21	- WN13X2:22	
	- WN17X1:1	- WN17X1:22	- WN17X2:21	- WN17X2:22	
	- WN19X1:1	- WN19X1:22	- WN19X2:21	- WN19X2:22	
	- WN21X1:1	- WN21X1:22	- WN17X1:21	- WN22X1:22	
	- WN23X1:1	- WN23X1:22	- WN12X1:A	- WN10X1:0	
	- WN13X2:N	- WN13X2:K			

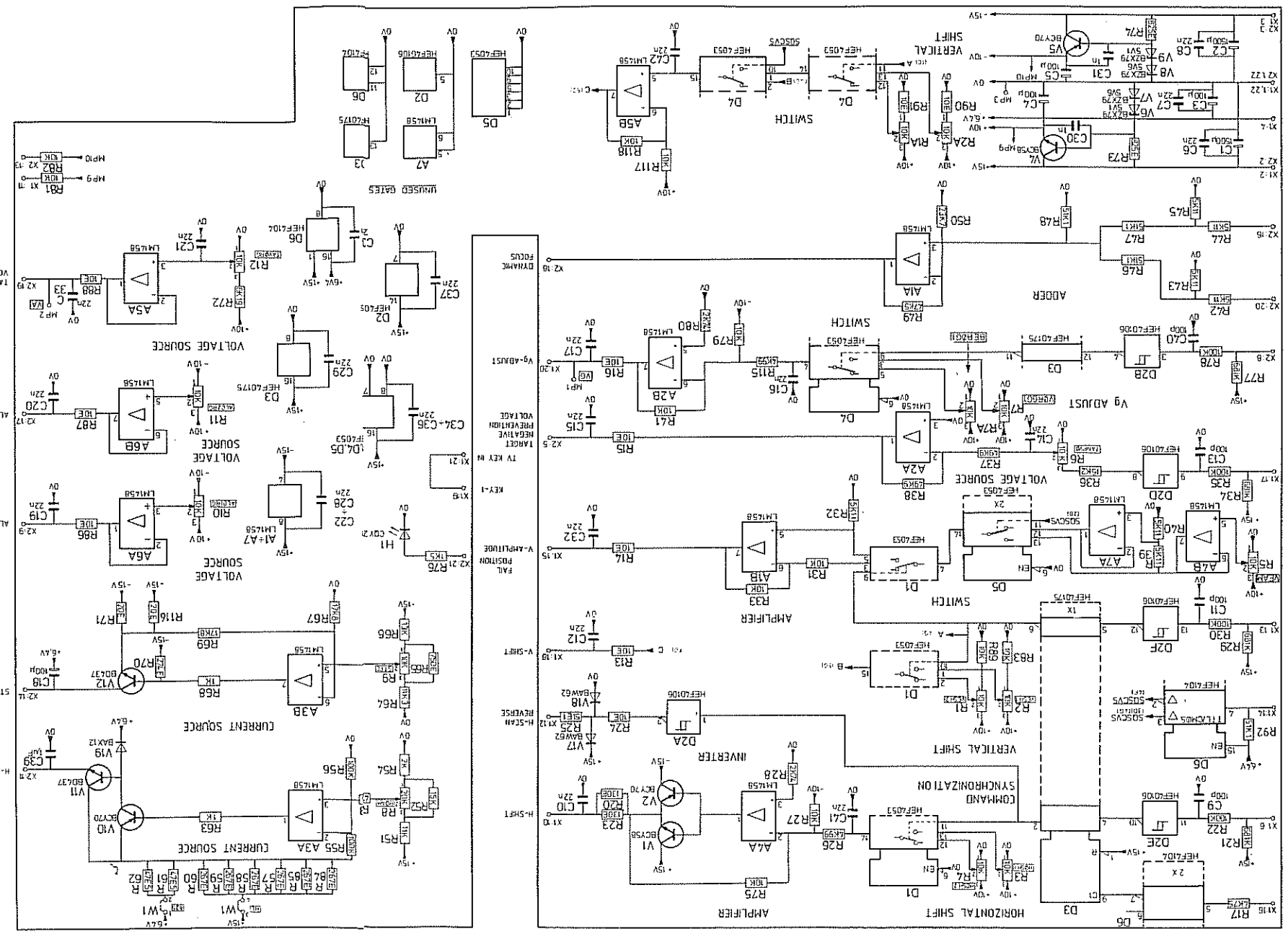
WIRING LIST OF BACKPANEL WN10

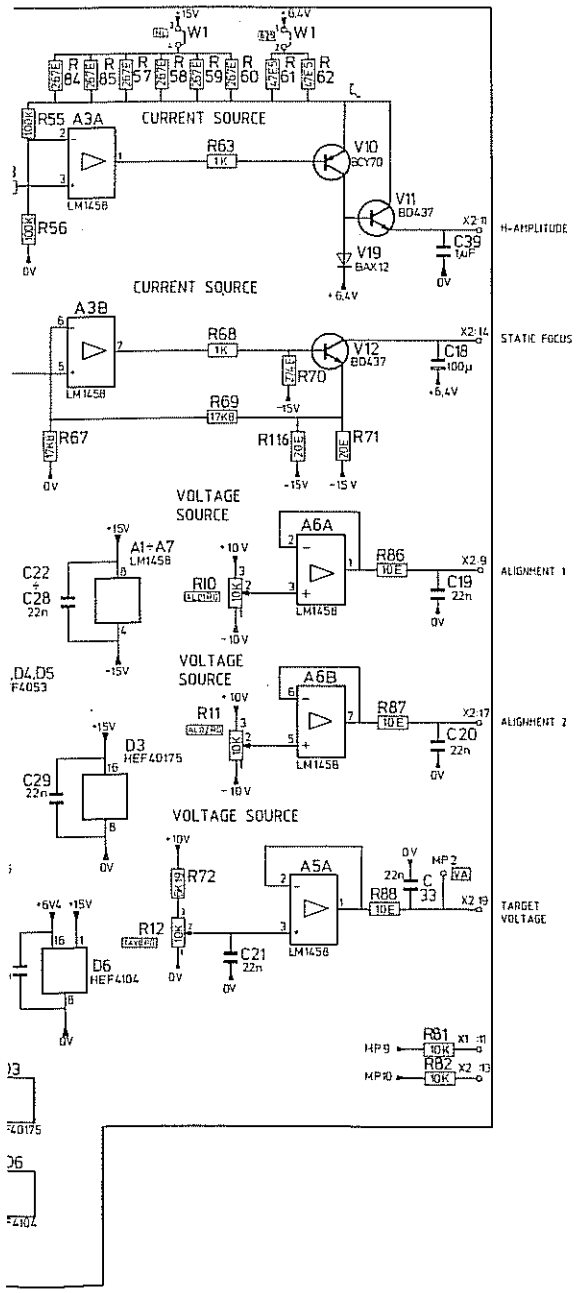


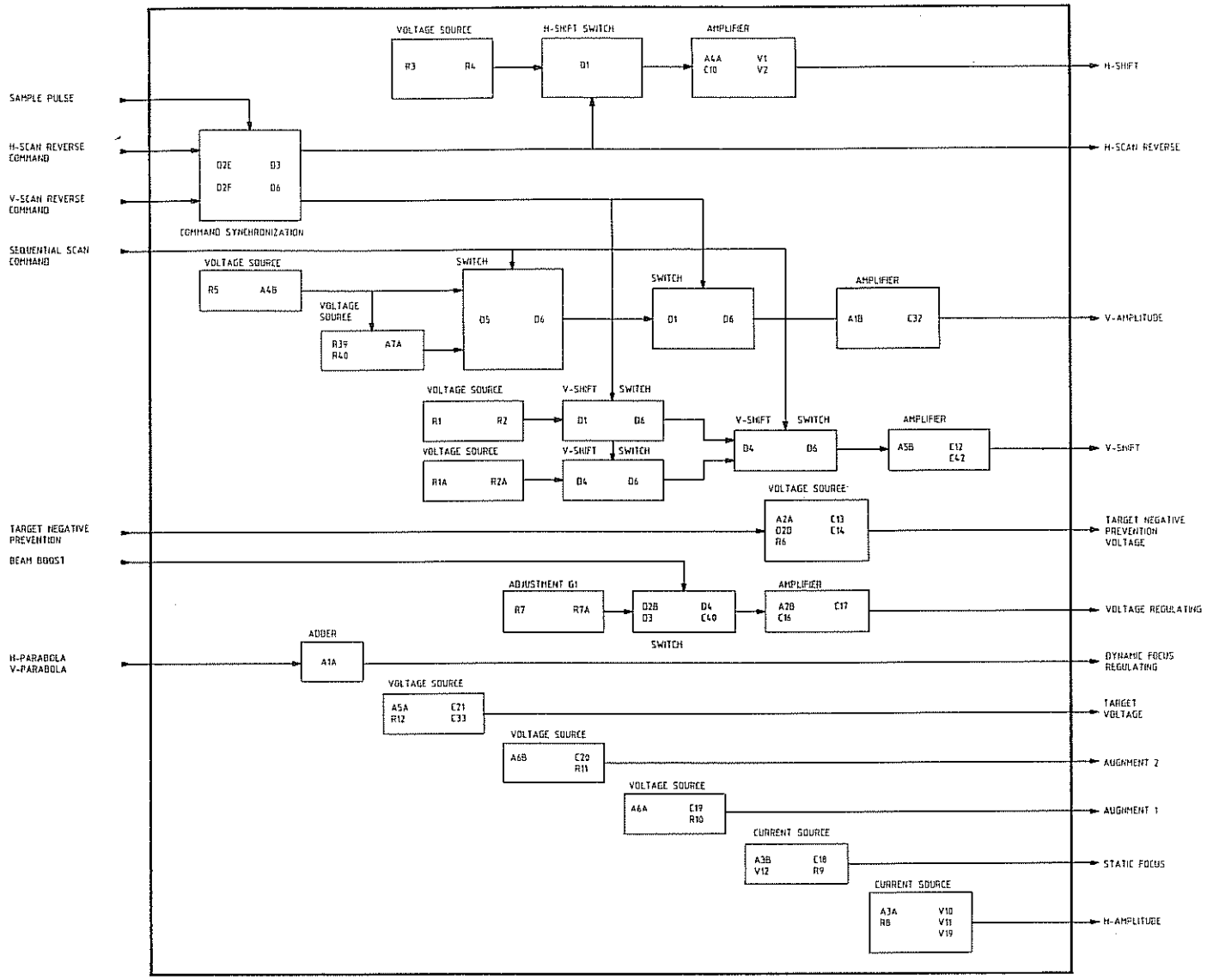
LAYOUT TV CONTROL UNIT WN

XTV5 TV Control Unit

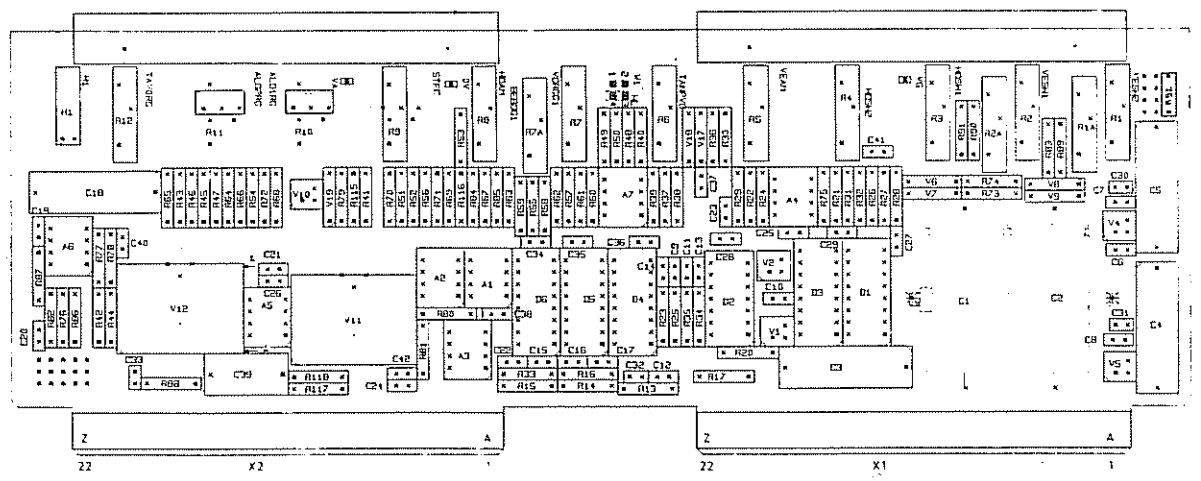
DETAIL 1 : CIRCUIT DIAGRAM







DETAIL 2: TROUBLESHOOTING CHART



DETAIL 3: PRINTED CIRCUIT BOARD LAYOUT

WN11

CAMERA CONTROL
4522 107 71162

DETAIL 1: CIRCUIT DIAGRAM

TOP VIEW

A1 ... A6
D1 ... D3

CLEAN CIRCLE COMMAND

COMPOSITE BLANKING

FAILURE POSITION

14 PULSE

14 VOLTAGE

VIDEO CAMERA GROUND

VIDEO CAMERA

KEY-3

KEY-1

DARK CURRENT PULSE ADDING

VGC VOLTAGE AMPLIFIER

VARIABLE GAIN AMPLIFIER

CLAMPING

BLANKING

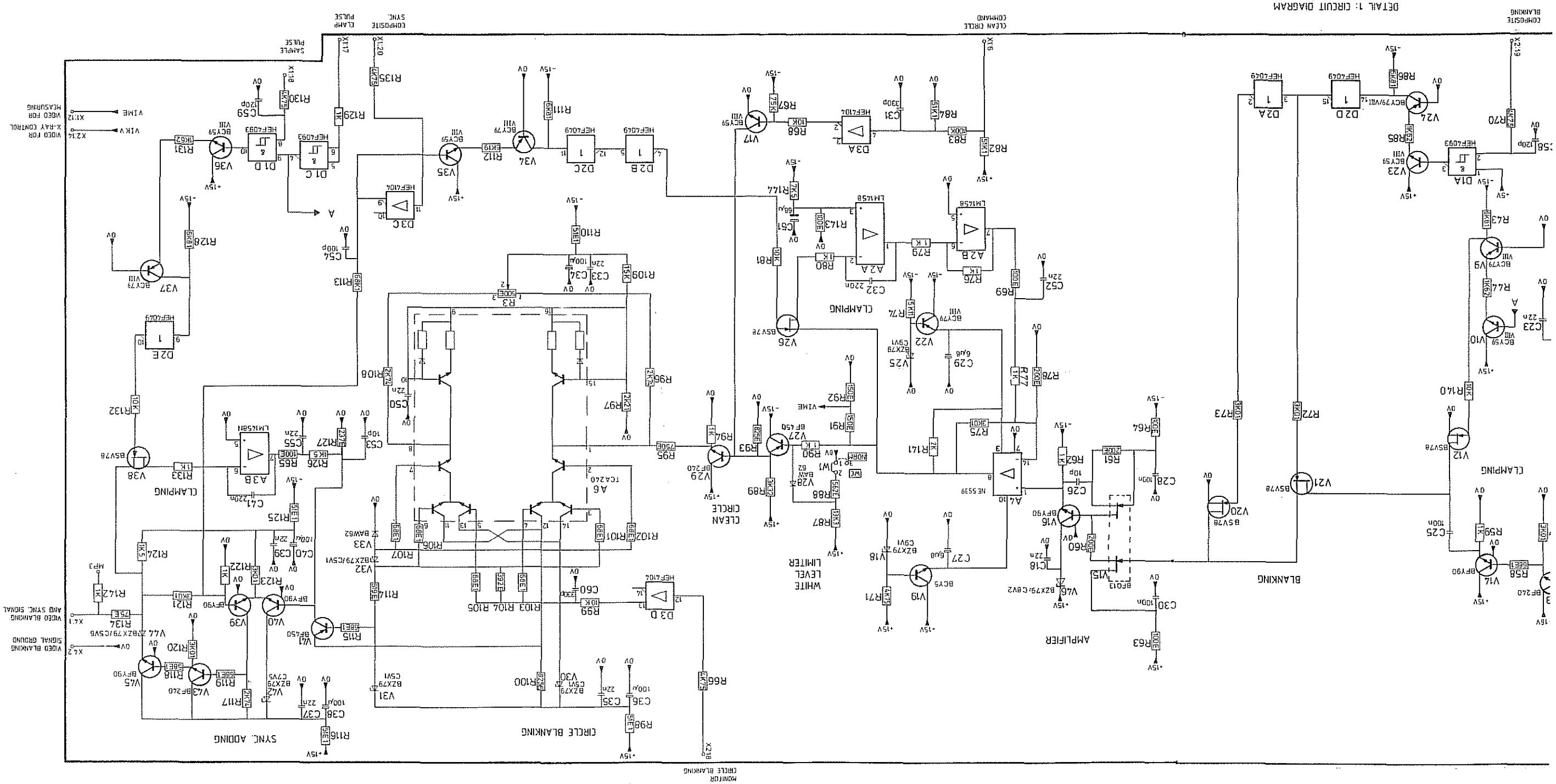
AMPLIFIER

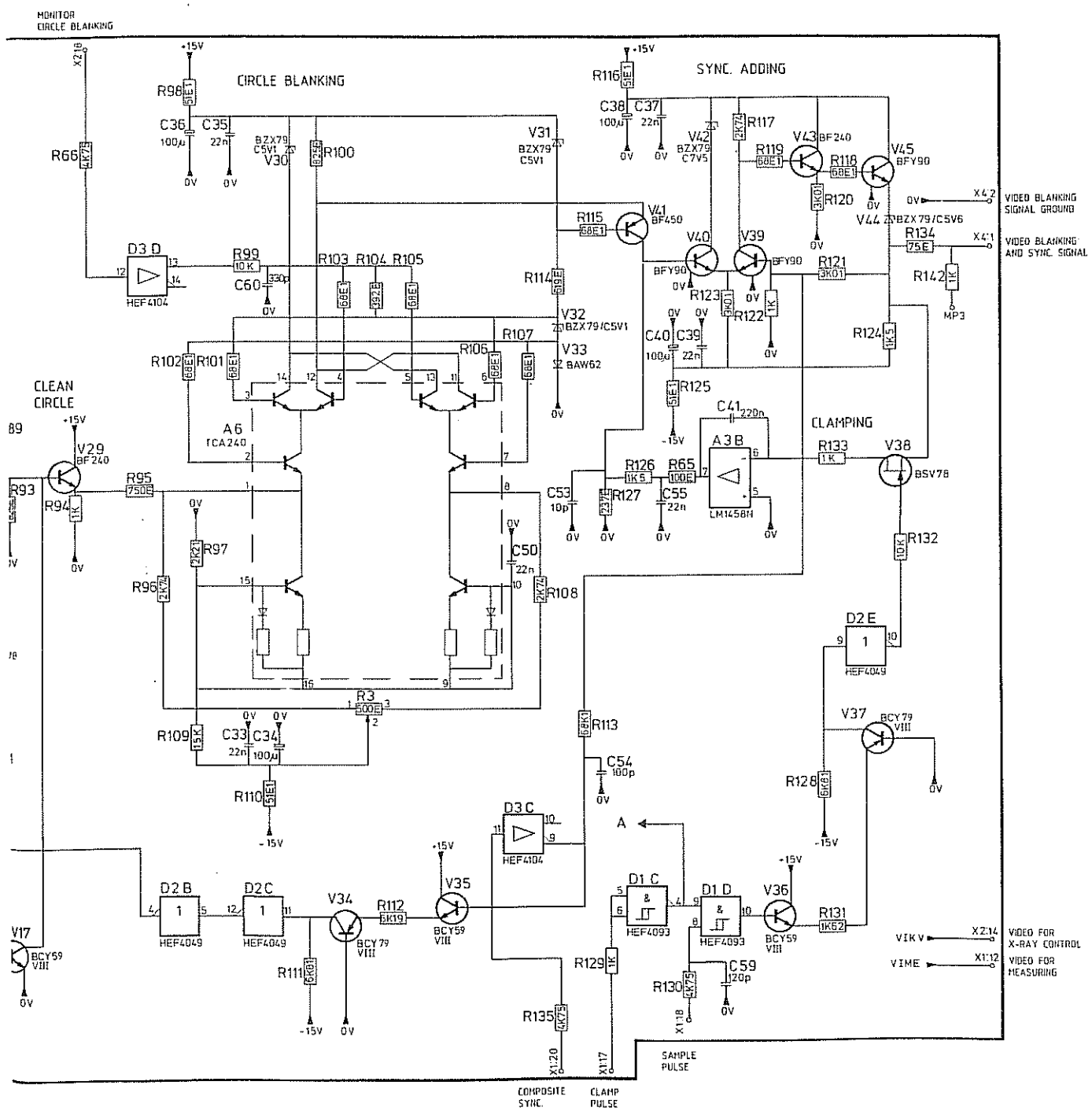
CLAMPING

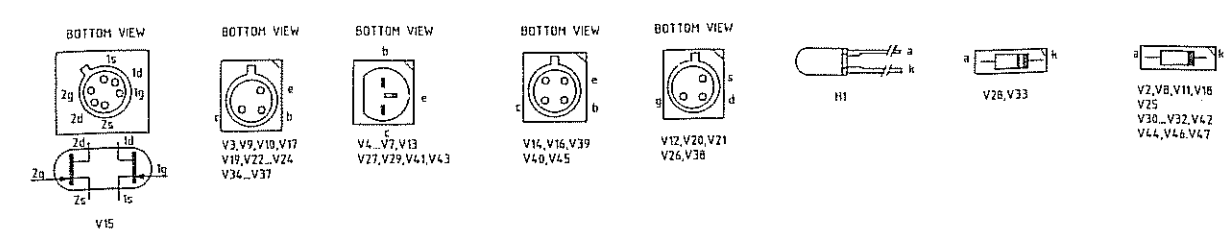
WHITE LEVEL LIMITER

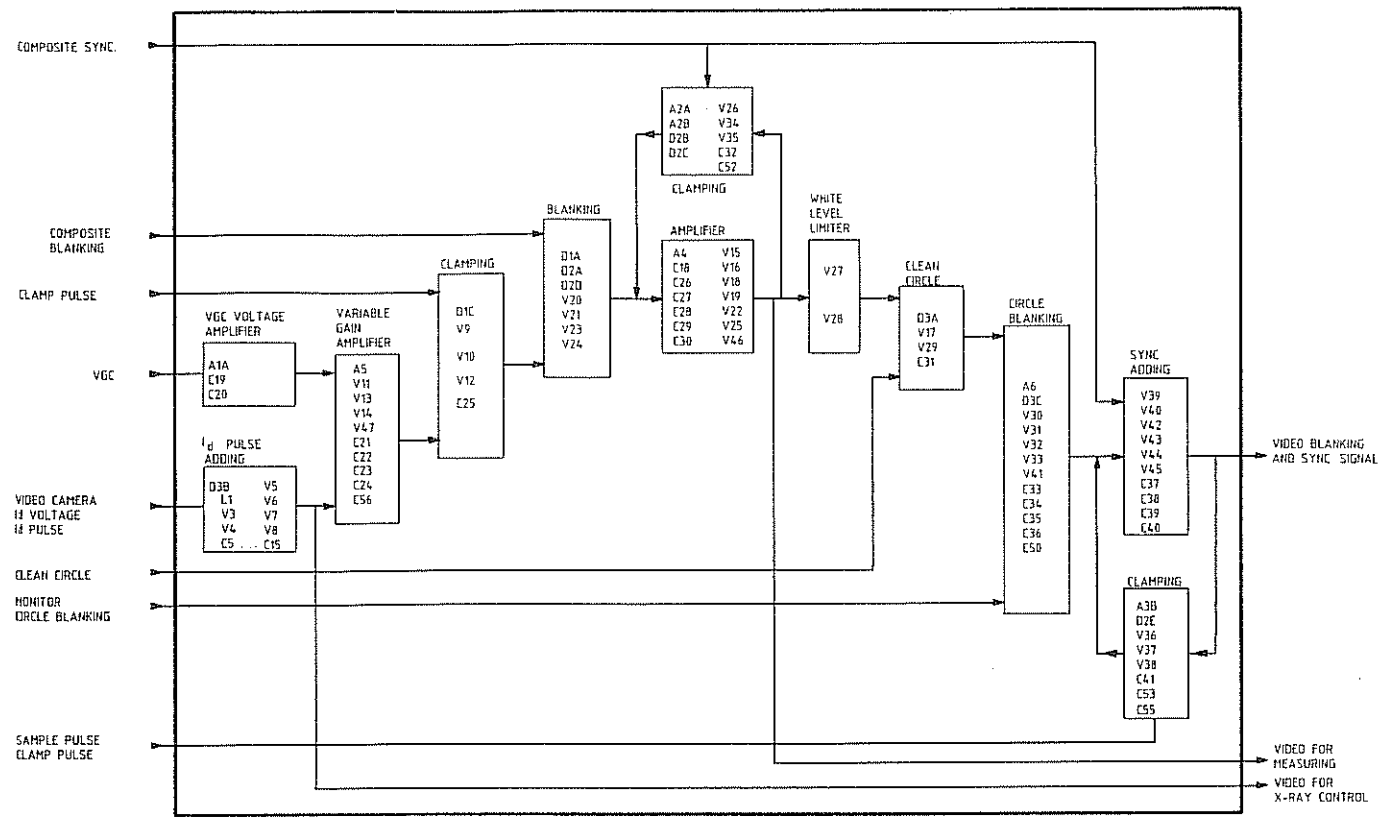
VGC

DETAIL 1: CIRCUIT DIAGRAM

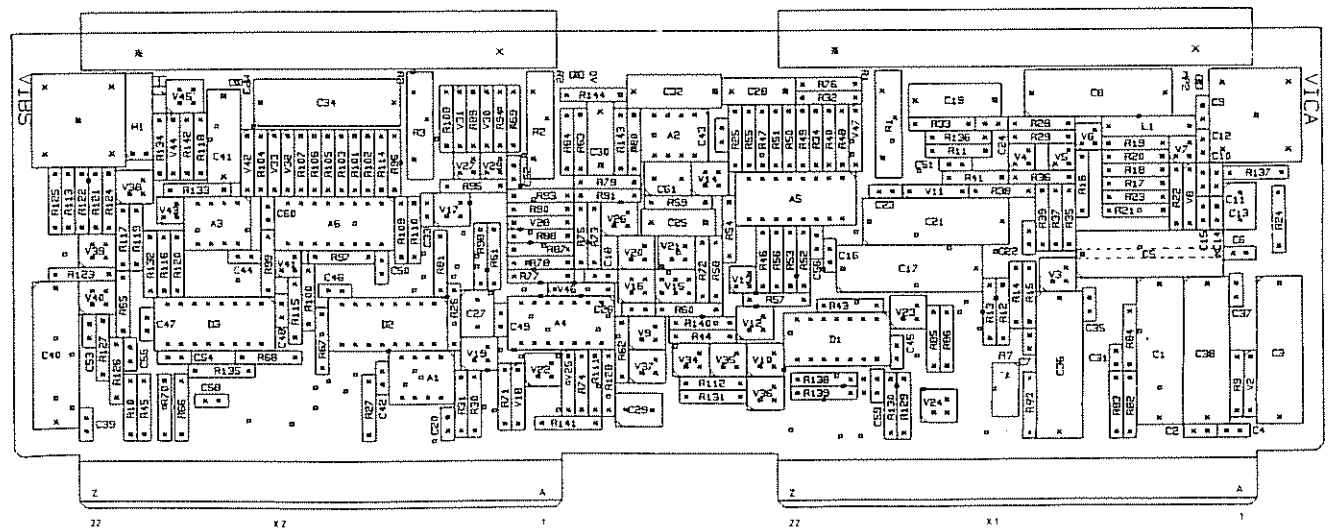








DETAIL 2: TROUBLESHOOTING CHART



DETAIL 3: PRINTED CIRCUIT BOARD LAYOUT

WN13

VIDEO PROCESSING BOARD
4522 107 75508

DETAIL 1: CIRCUIT DIAGRAM

DARK CURRENT PULSE ADDING

VGC VOLTAGE AMPLIFIER

VARIABLE GAIN AMPLIFIER

BLANKING

CLAMPING

AMPLIFIER

WHITE LEVEL LIMITER

CLAMPING

VIDEO CAMERA

GROUND

Id VOLTAGE

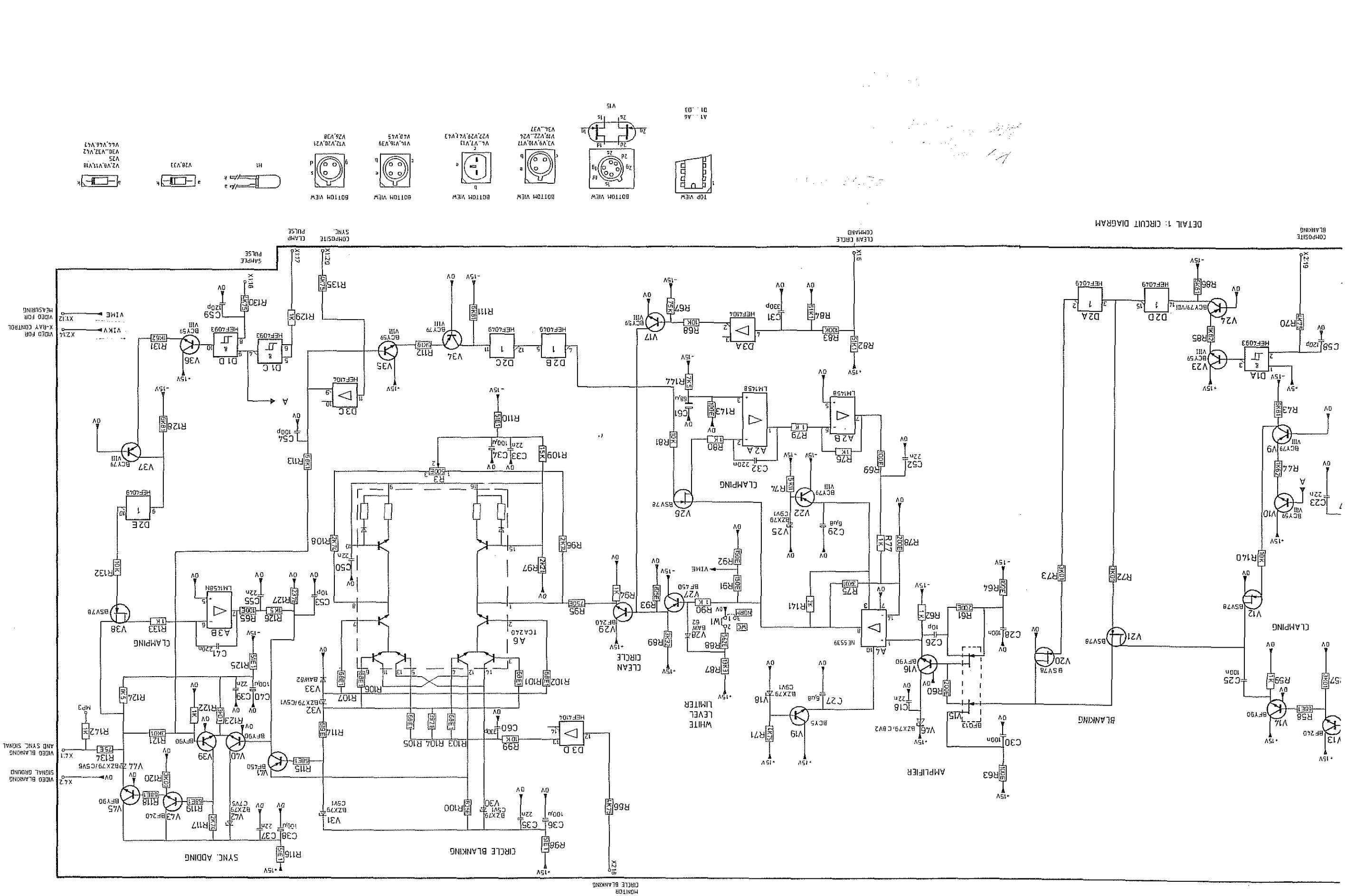
Id PULSE

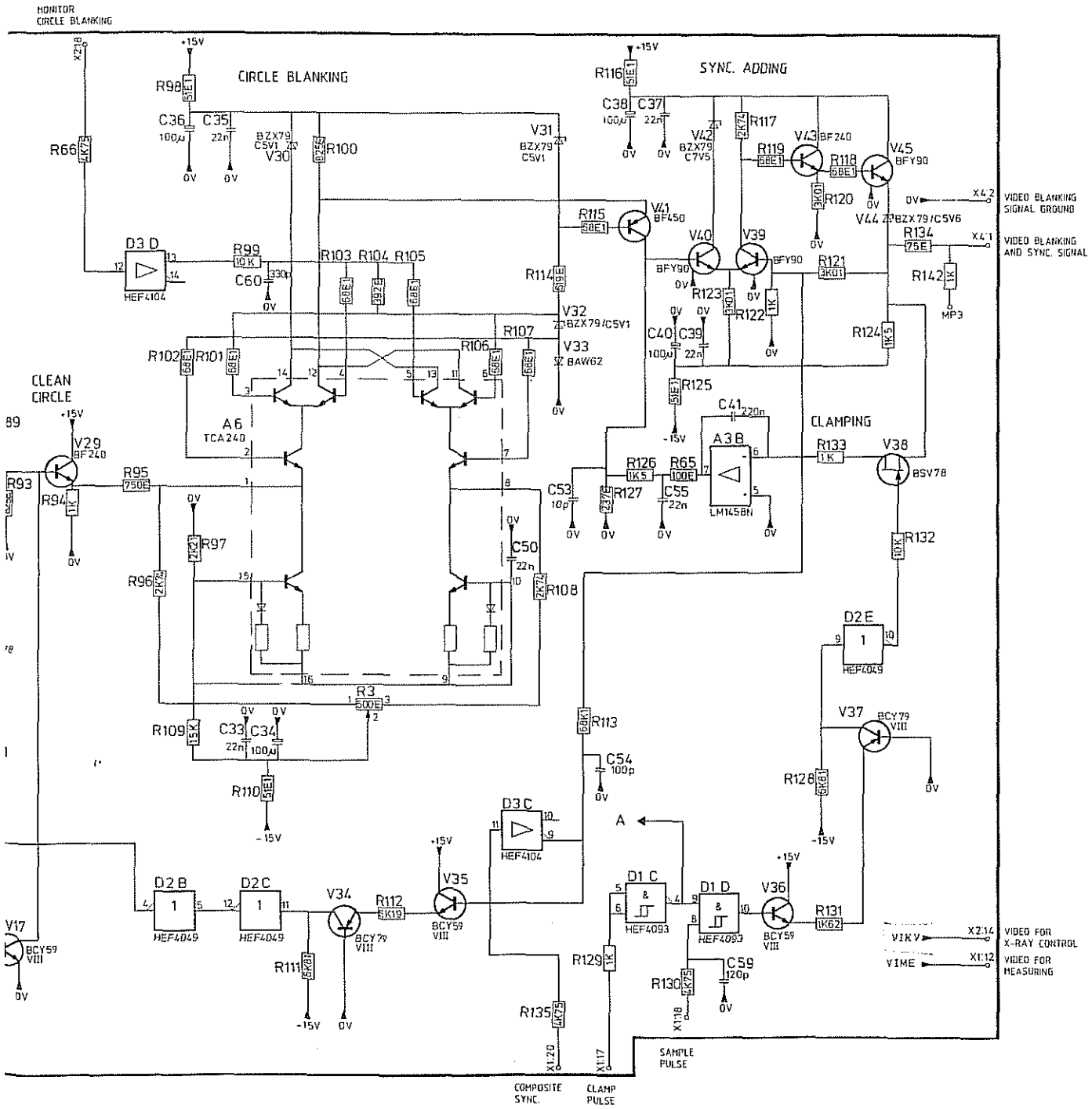
KEY-1

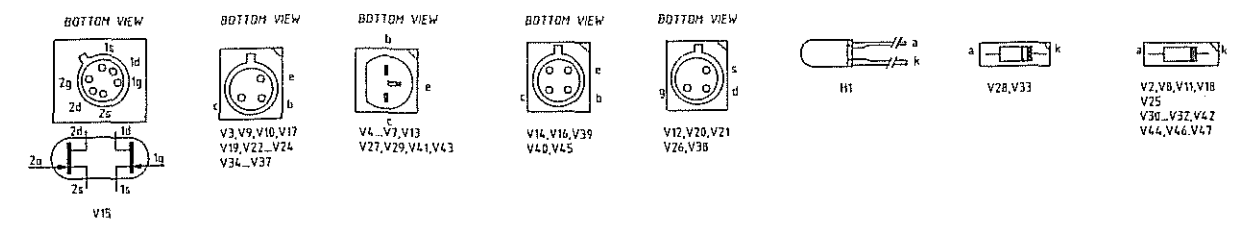
KEY-3

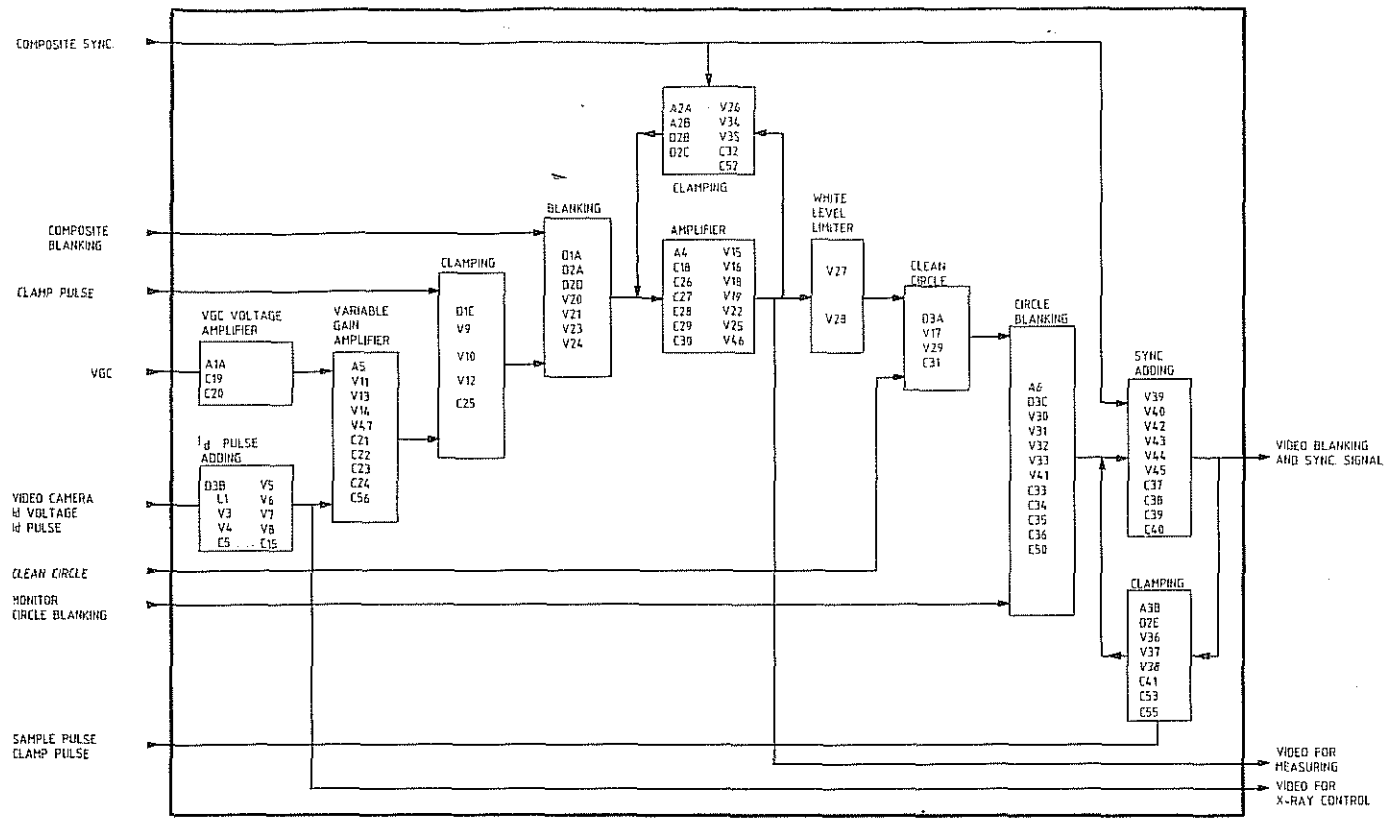
VGC

DETAIL 1: CIRCUIT DIAGRAM

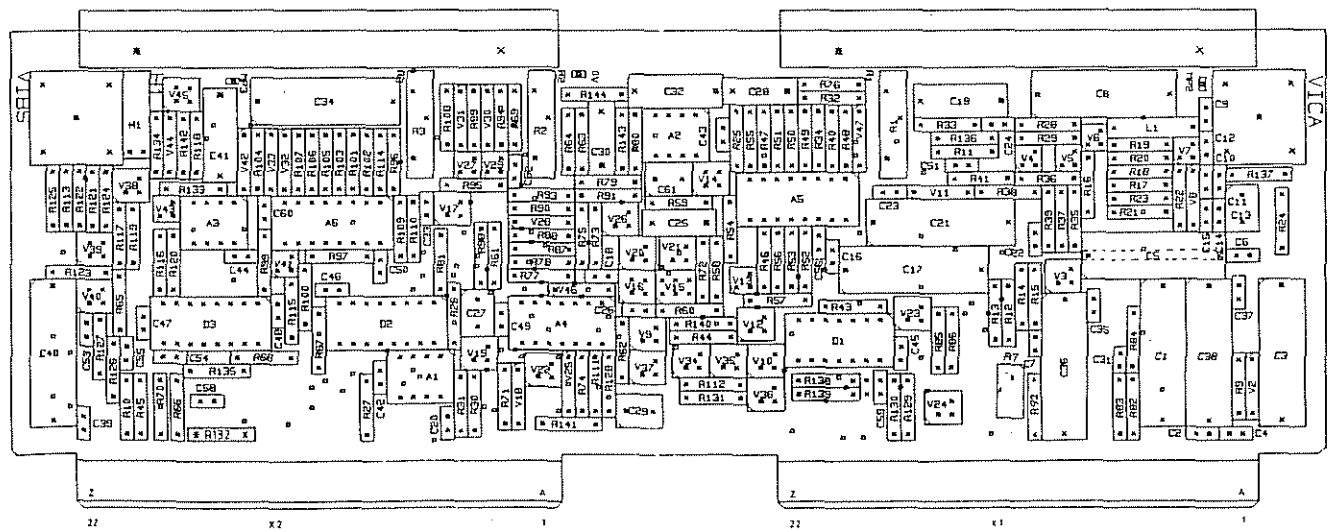








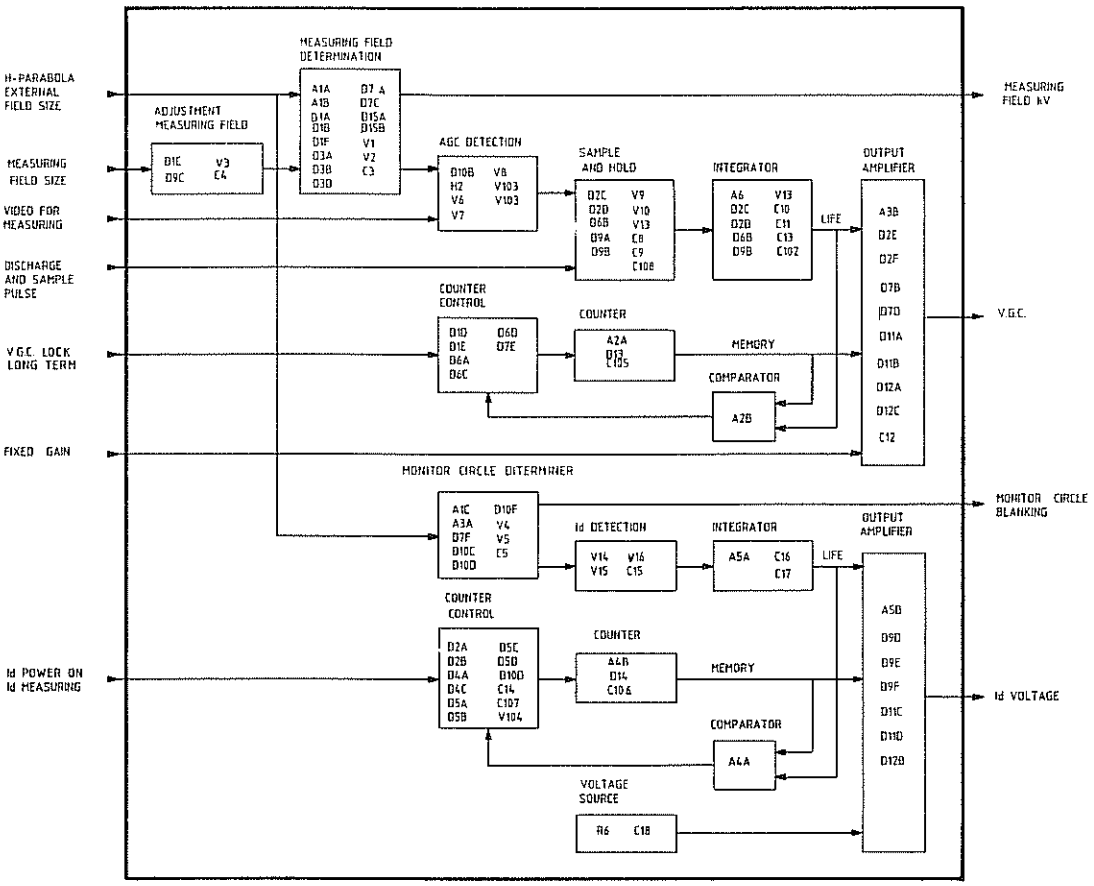
DETAIL 2: TROUBLESHOOTING CHART



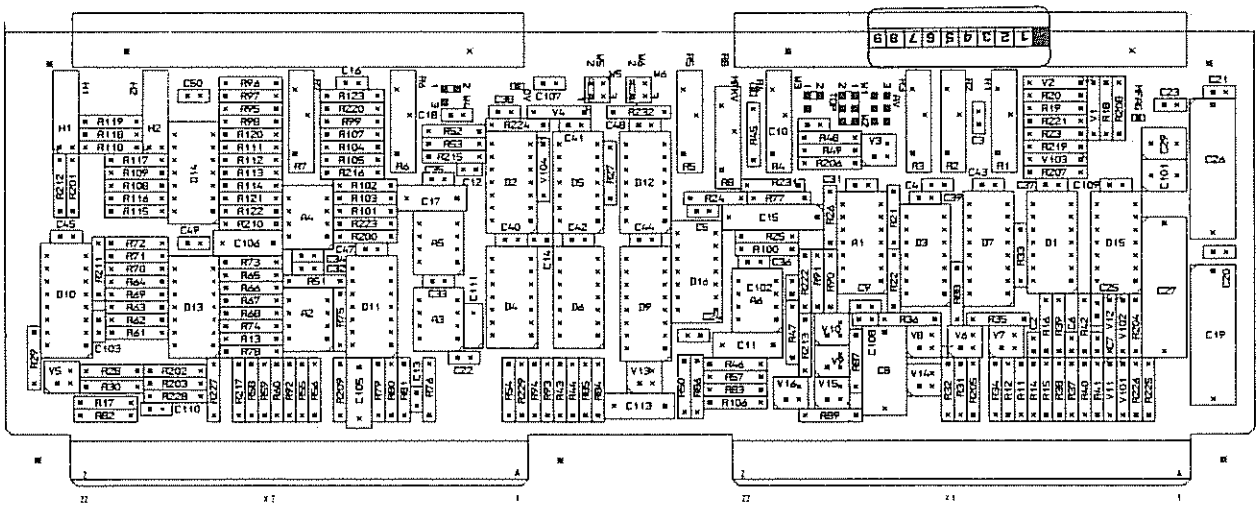
DETAIL 3: PRINTED CIRCUIT BOARD LAYOUT

WN13

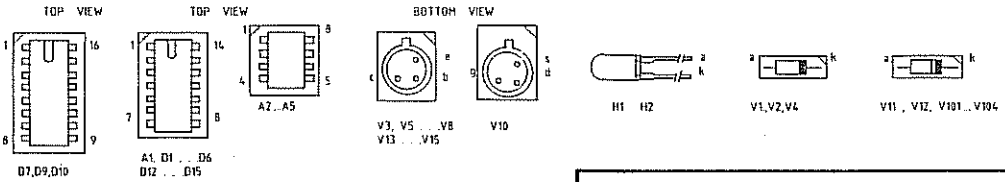
VIDEO PROCESSING BOARD
4522 107 75509



DETAIL 2: TROUBLESHOOTING CHART



DETAIL 3: PRINTED CIRCUIT BOARD LAYOUT



WN17

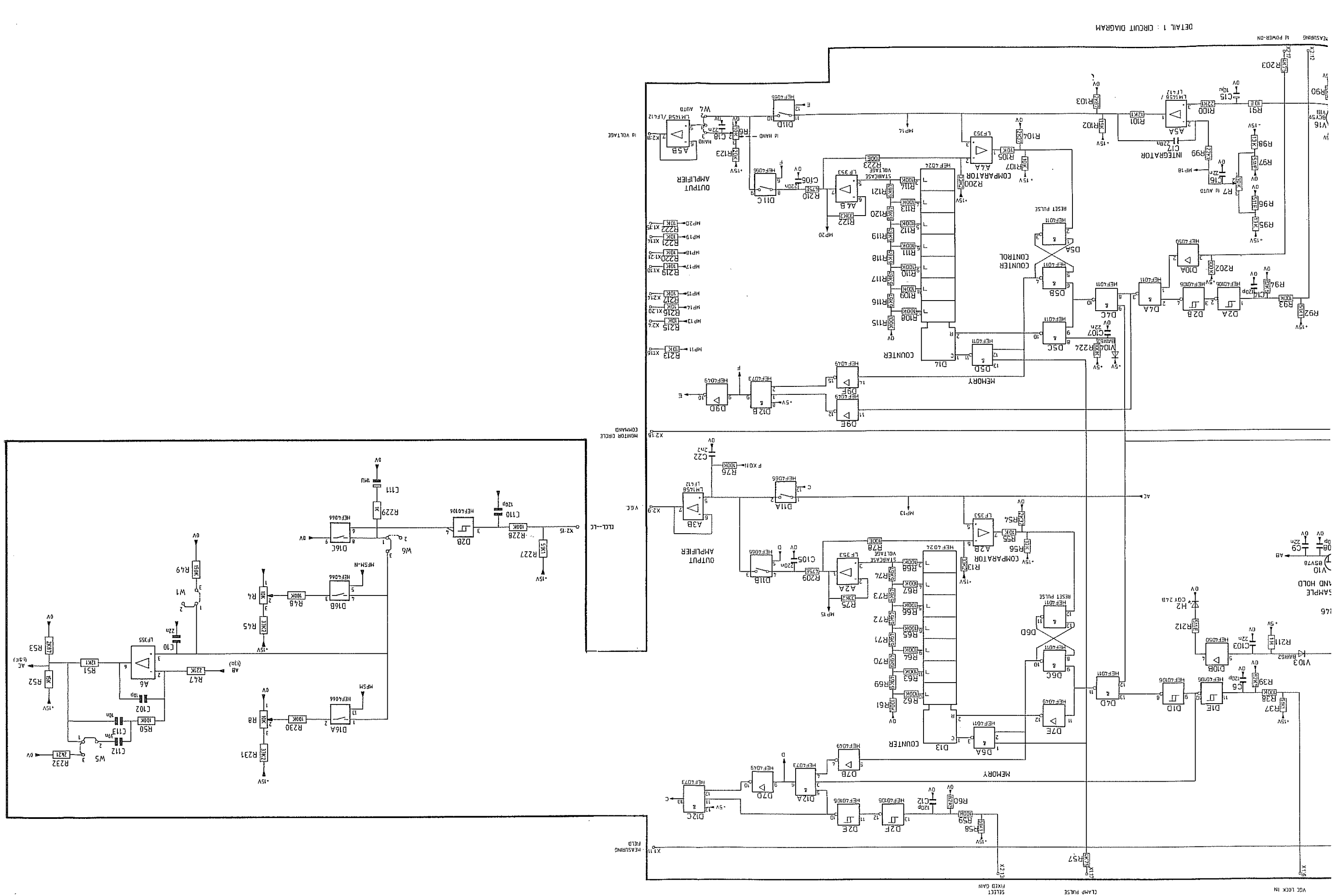
AGC/Id
4522 107 70905/6

3

DETAIL 1 : CIRCUIT DIAGRAM

XTV5 TV Control Unit

DETAIL 1 : CIRCUIT DIAGRAM



XTV 5 TV Control Unit

SELECT EXTERNAL SYNC.

SELECT CRYSTAL

EVEN LIN

VERTICAL FREQUENCY SYNCHRONIZER

HORIZONTAL FREQUENCY SYNCHRONIZER

CRYSTAL OSCILLATOR

SYNC/BLANKING GENERATOR

SWITCH-ON TIME DELAY

MAINS LOCK

MAIN OSCILLATOR

KEY 5

KEY 6

EXTERNAL SYNC

FAIL POSITION

MAIN PHASE

MAINS LOCK OF

D16 - HEF4011

D5 - HEF4027

D15 - HEF4066
D18 - HEF40106

D1 - 005501

D2,D9,D28 - HEF4027
D8,D23 - MC14538
D12 - 74LS221

A1 - LM458

A2 - LF353

DETAIL 1: CIRCUIT DIAGRAM

DETAIL 1: CIRCUIT DIAGRAM

MAIN OSCILLATOR

SYNC/BLANKING GENERATOR

SWITCH-ON TIME DELAY

V-BLANKING DETERMINER

PULSE WIDTH DETERMINER

PULSE DETERMINER

COMBI PULSE MIXER

BUFFER

EVEN LINE KEYING

SEQUENTIAL SCAN C

9 10 11 12 13 14 15 16 17 18 19 20 21 22 23

XTV 5 TV Control Unit

EVEN LINE KEYING

PULSE WIDTH DETERMINER

PULSE DETERMINER

COMBI PULSE MIXER

V-BLANKING DETERMINER

BUFFER

SEQUENTIAL SCAN COMMAND SYNCHRONIZER

SEQUENTIAL SCAN COMMAND

DISCHARGE PULSE

COMPOSITE BLANKING

N RESET

IV ECU READY

N POWER-ON

COMBI PULSE

N PULSE

CLAMP PULSE

H-BLANKING

SYNC OUT

COMPOSITE SYNC

V-BLANKING

SAMPLE PULSE

SAMPLE PULSE LOW COMMAND

SEQUENTIAL SCAN

EVEN LINE

SELECT EXTERNAL SYNC

EXTERNAL SYNC

MAIN PHASE

SELECT CRYSTAL

MAINS LOCK OF

SEQUENTIAL SCAN COMMAND

GATING

SWITCH

VERTICAL SYNCHRO

HORIZONT SYNCHRO

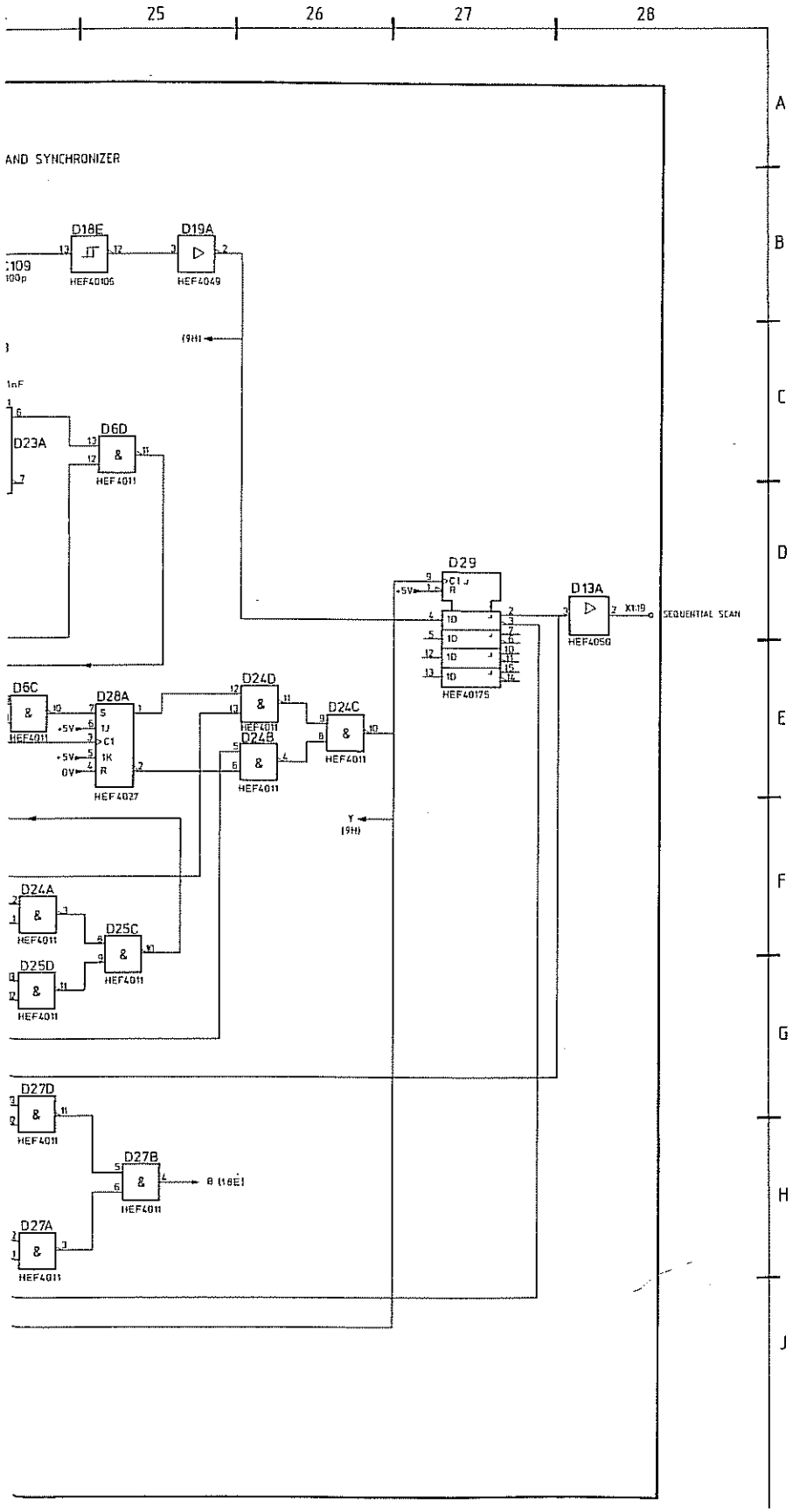
MAINS LOCK

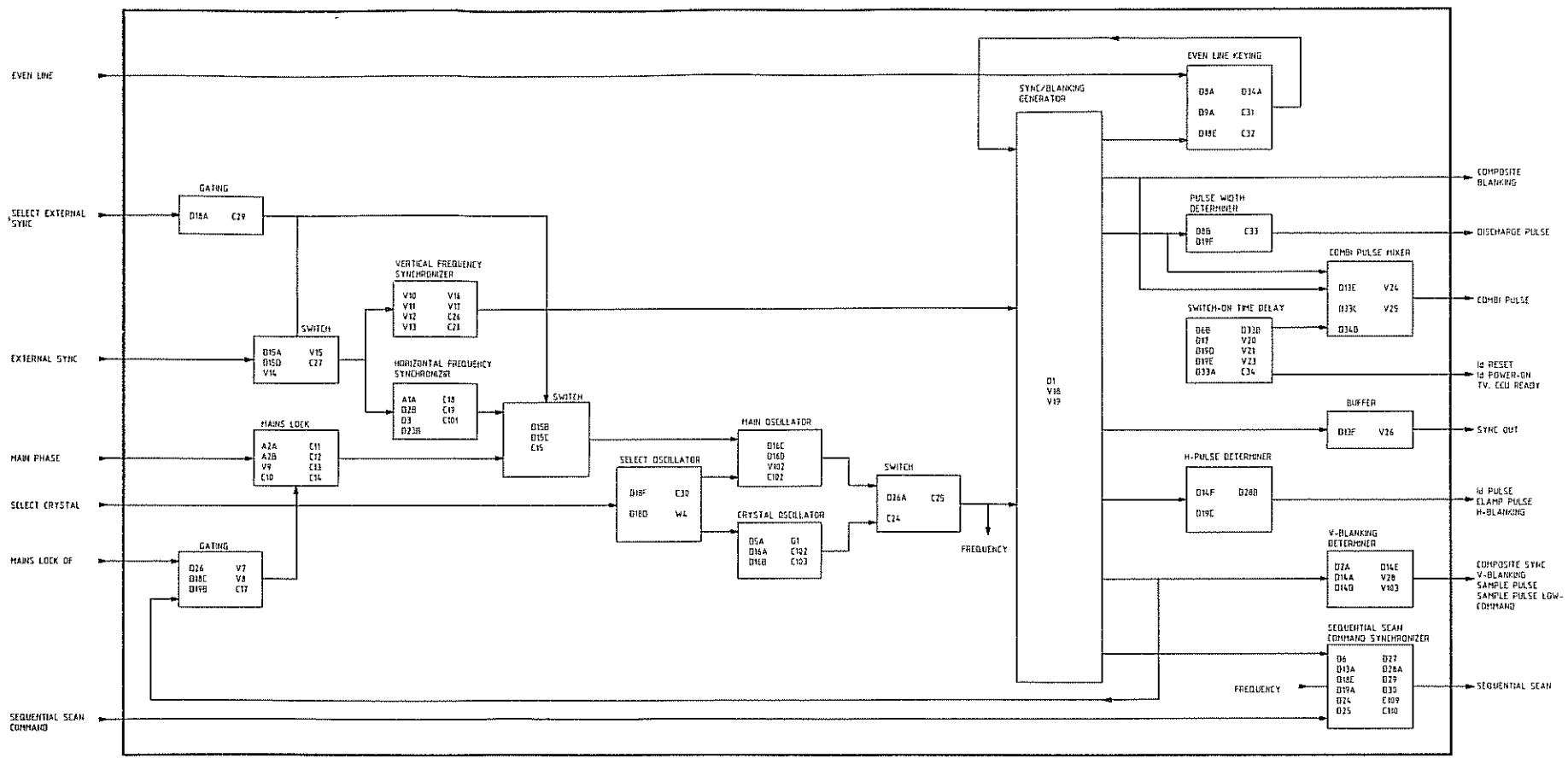
TOP VIEW

BOTTOM VIEW

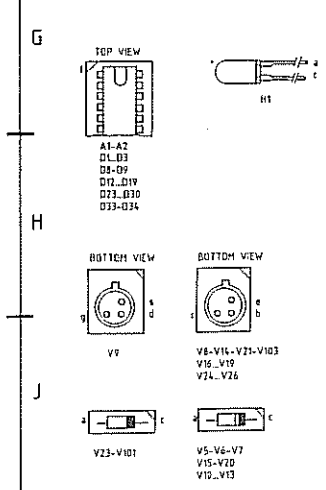
D3 - HEF4050

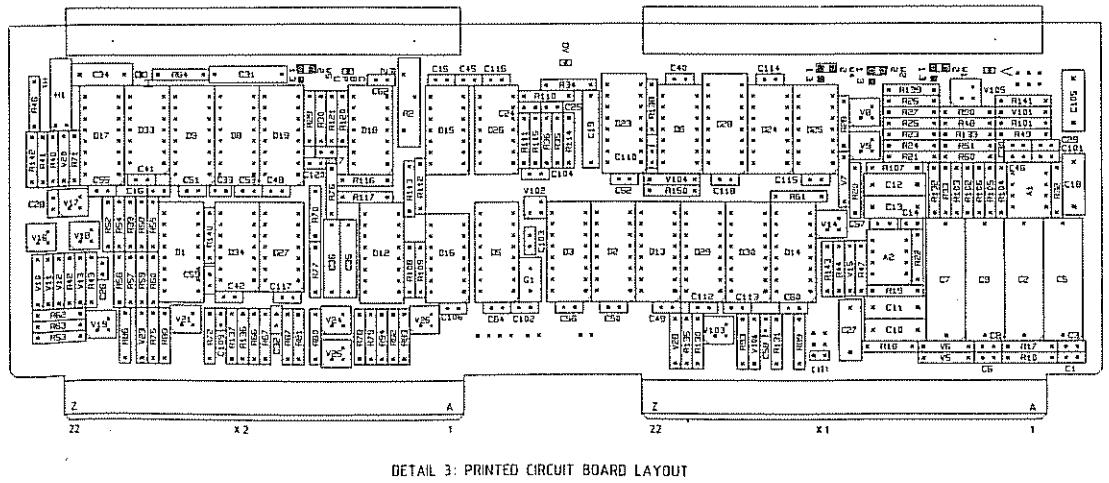
D19,D14 - HEF4049





DETAIL 2: TROUBLESHOOTING CHART





DETAIL 3: PRINTED CIRCUIT BOARD LAYOUT

WN19

PULSE GENERATOR
4522 107 71012

XTV 5 TV Control Unit

SELECT EXTERNAL SYNC

SELECT CRYSTAL

SYNC/BLANKING GENERATOR

SWITCH-ON TIME DELAY

VERTICAL FREQUENCY SYNCHRONIZER

HORIZONTAL FREQUENCY SYNCHRONIZER

CRYSTAL OSCILLATOR

MAINS LOCK

MAIN OSCILLATOR

KEY 5

KEY 6

EXTERNAL SYNC

FAIL POSITION

MAIN PHASE

D1 – 905501

D2,D9,D28 – HEF4027
D8,D23 – MC14538
D12 – 74LS221

D5 – HEF4027

D15 – HEF4066
D18 – HEF40106

D16 – HEF4011

A1 – LM1458

A2 – LF353

MAINS LOCK DF

DETAIL 1: CIRCUIT DIAGRAM

DETAIL 1: CIRCUIT DIAGRAM

MAIN OSCILLATOR

OSCILLATOR

SYNC/BLANKING GENERATOR

SWITCH-ON TIME DELAY

V-BLANKING DETERMINER

PULSE DETERMINER

COMBI PULSE MIXER

PULSE WIDTH DETERMINER

EVEN LINE KEYING

SEQUENTIAL SCAN COMMAND

BUFFER

A1 - LM1458

D1 - 6D5501

D2,D9,D28- HEF4027
D8,D23 - MC14538
D12 %15221

D5 - HEF4066
D18 - HEF40106

D6,D24,D25 HEF401H
D26,D27 HEF4073
D33 HEF4082
D34

D13 - HEF4050
D19,D14 - HEF4049

D17-HEF4040
D29HEF4075
D30HEF401H

D3 HEF4046

D2

D5

D4

D7

D10

D11

D15

D16

D20

D21

D22

D23

D26

D27

D28

D30

D31

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D56

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D58

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D60

D61

D62

D63

D64

D65

D66

D67

D68

D69

XTV 5 TV Control Unit

EVEN LINE KEYING

PULSE WIDTH DETERMINER

COMBI PULSE MIXER

PULSE DETERMINER

V-BLANKING DETERMINER

BUFFER

SEQUENTIAL SCAN COMMAND SYNCHRONIZER

SEQUENTIAL SCAN COMMAND

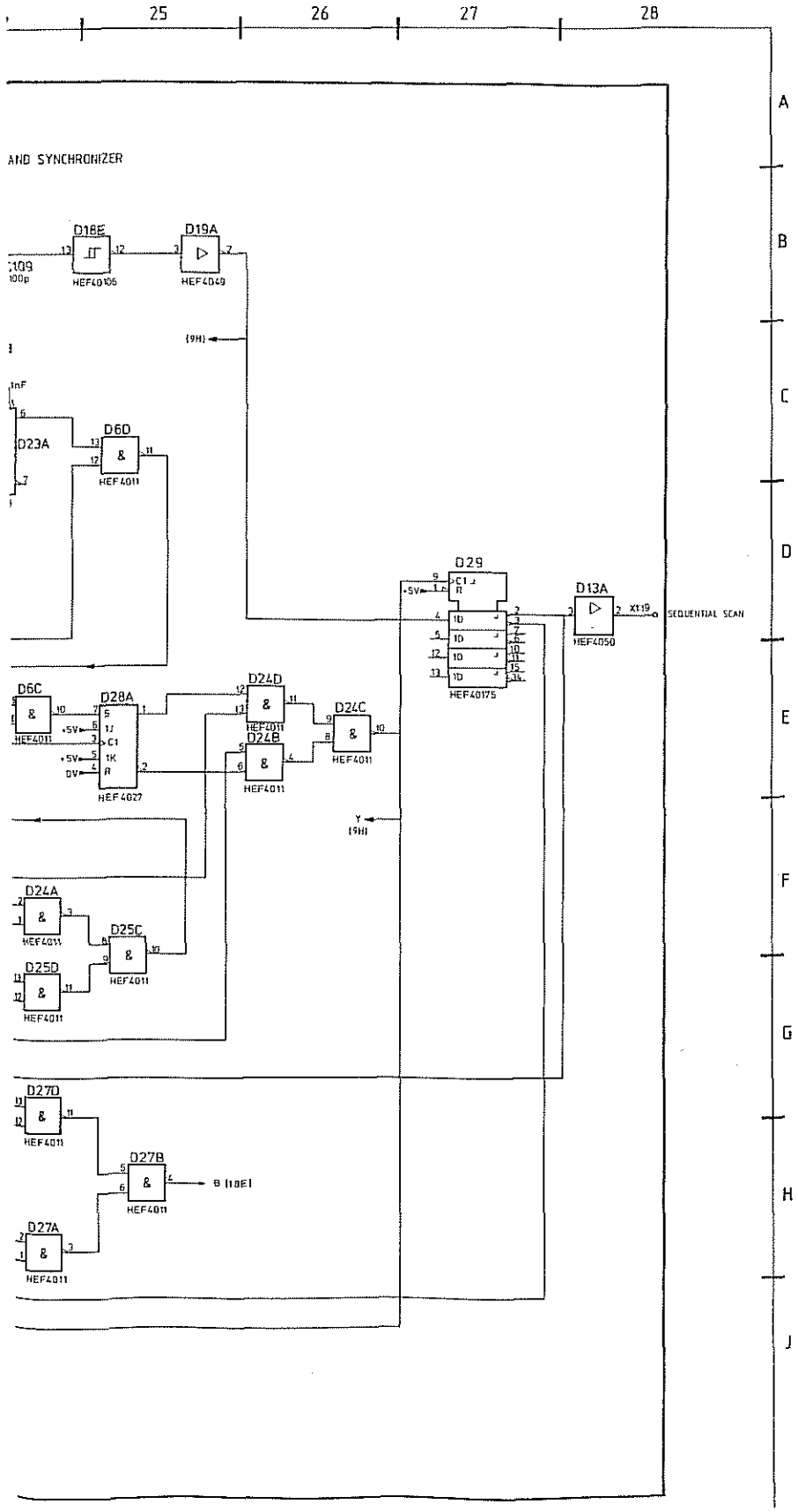
X2:14 DISCHARGE PULSE
X1:18 COMPOSITE BLANKING
X2:16 µP RESET
X2:18 TV ICU READY
X2:19 µP POWER-ON
X2:11 COMBI PULSE
X2:20 µP PULSE
X1:15 CLAMP PULSE
X1:12 H-BLANKING
X 2:4 SYNC OUT
X2:9 COMPOSITE SYNC
X1:11 V-BLANKING
X1:16 SAMPLE PULSE
X1:20 SAMPLE PULSE LOW COMMAND
X2:17
X1:14
X1:17
X 2:5

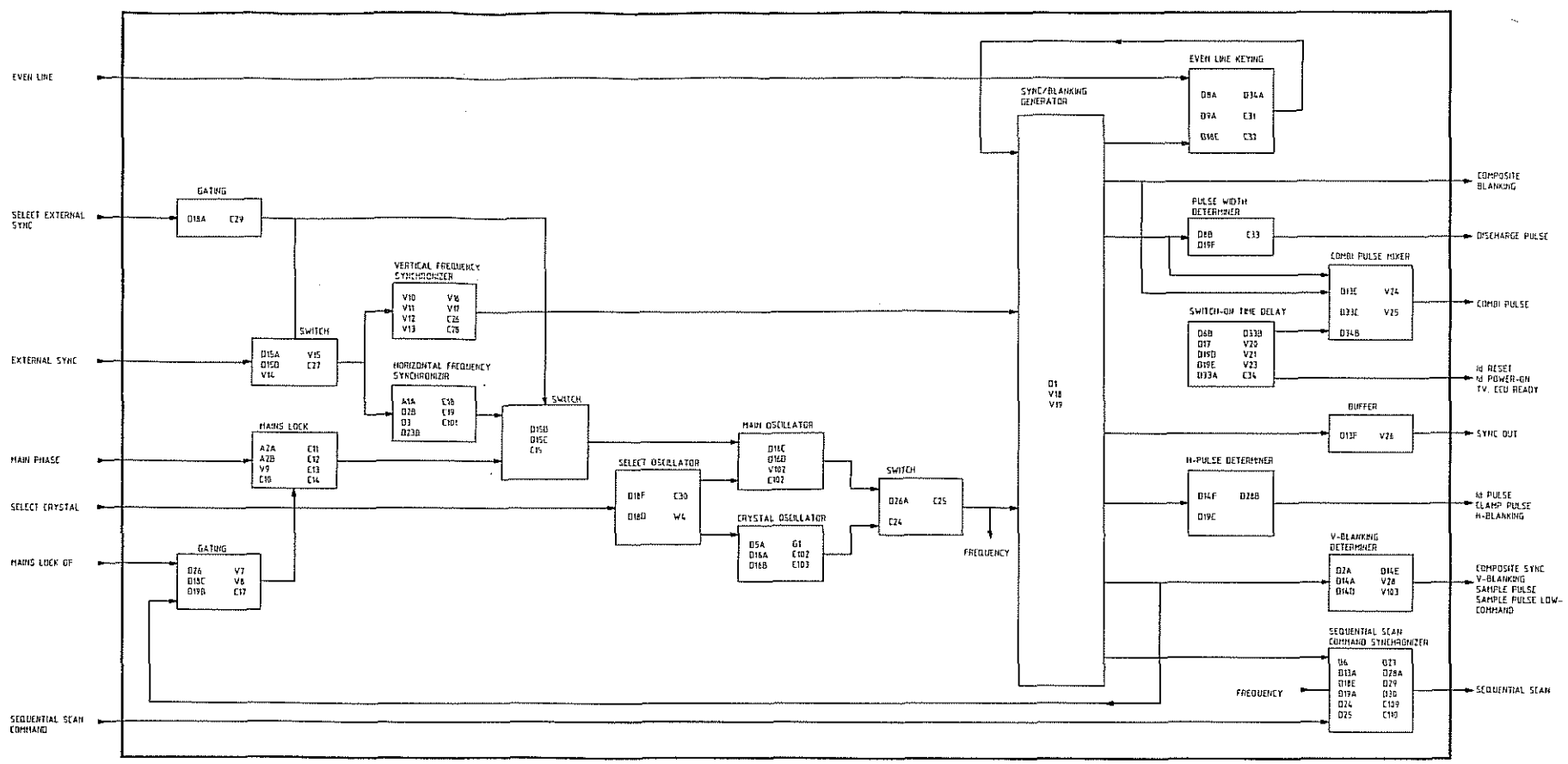
D3 HEF4046
D29 HEF4075
D30 HEF4017
D17 - HEF4040
D13 - HEF4050
D19,D14 - HEF4049
D6,D24,D25 HEF4011
D26,D27 HEF4011
D33 HEF4073
D34 HEF4082

SEQUENTIAL SCAN
SEQUENTIAL SCAN COMMAND

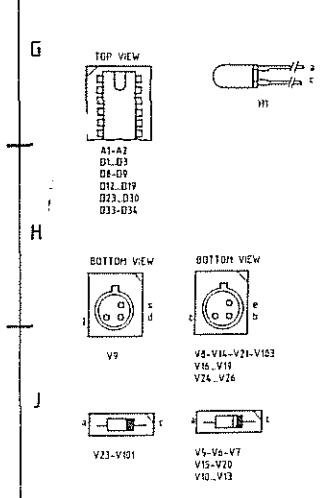
EVEN LINE
SELECT EXTERNAL SYNC
EXTERNAL SYNC
MAIN PHASE
SELECT CRYSTAL
MAINS LOCK DF
SEQUENTIAL SCAN COMMAND

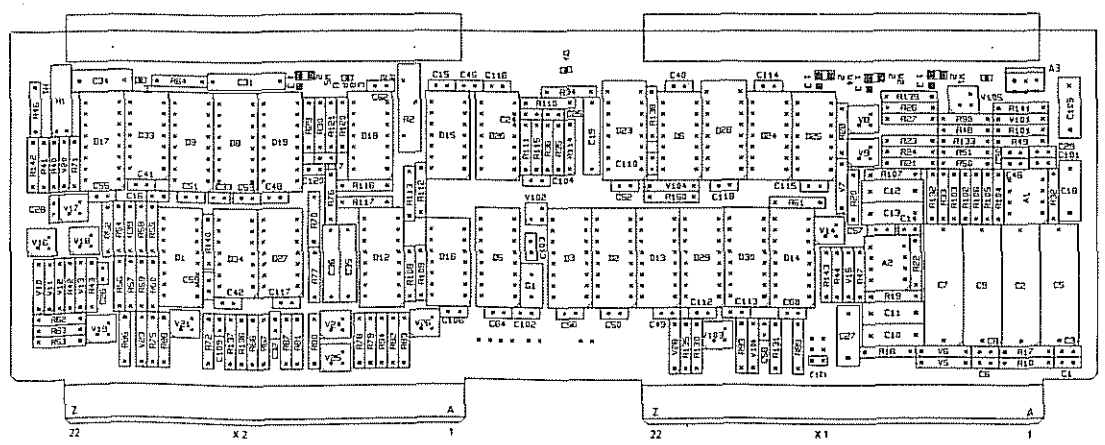
TOP VIEW
BOTTOM VIEW
BOTTOM VIEW





DETAIL 2: TROUBLESHOOTING CHART

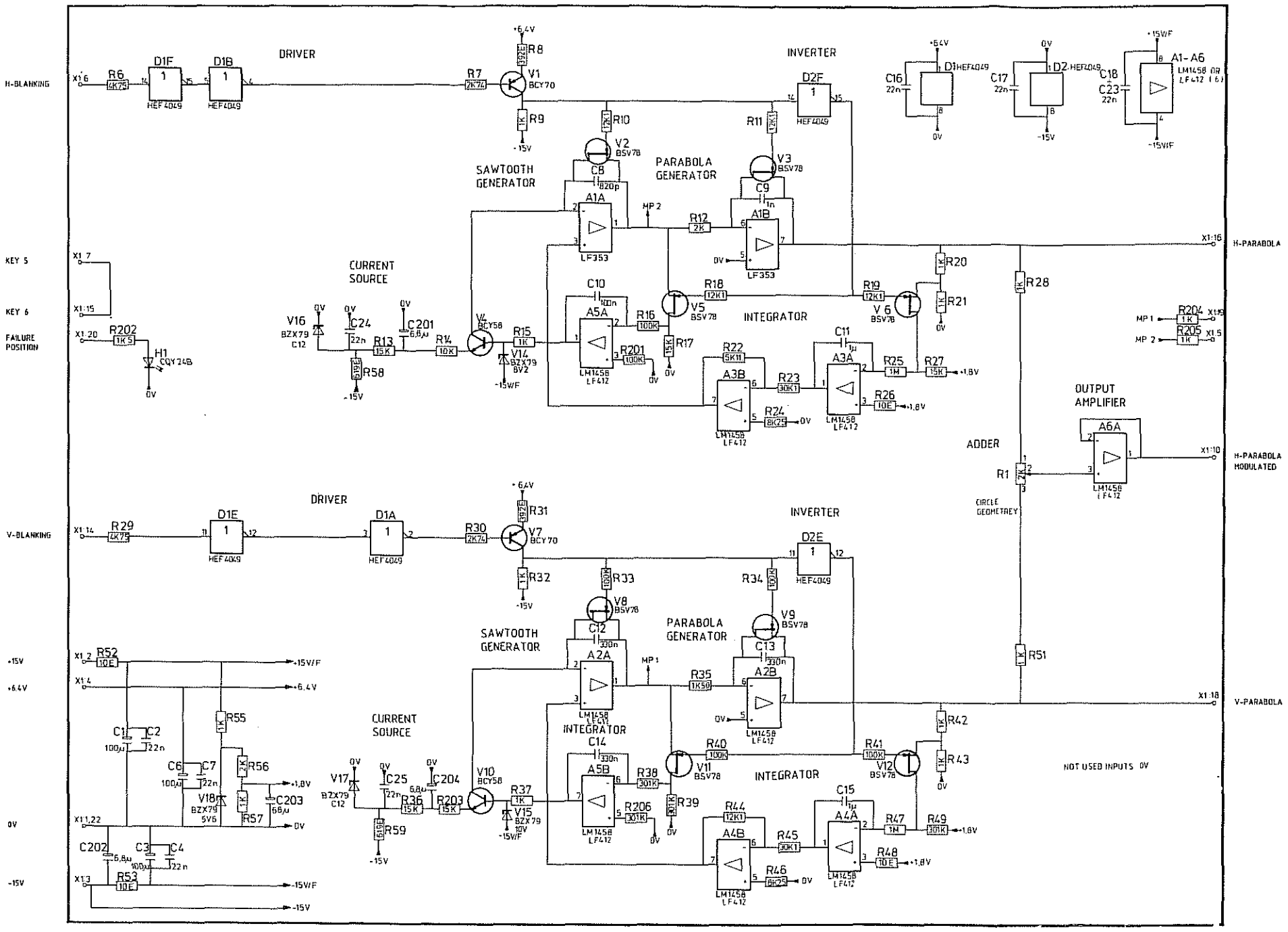




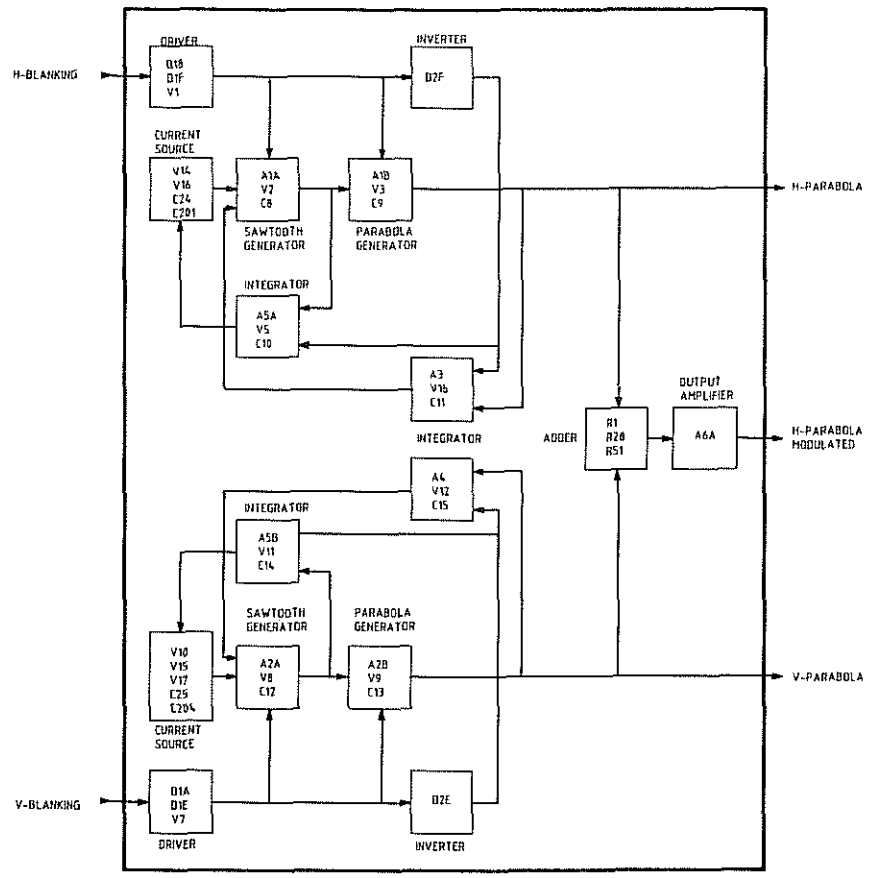
DETAIL 3: PRINTED CIRCUIT BOARD LAYOUT

WN19

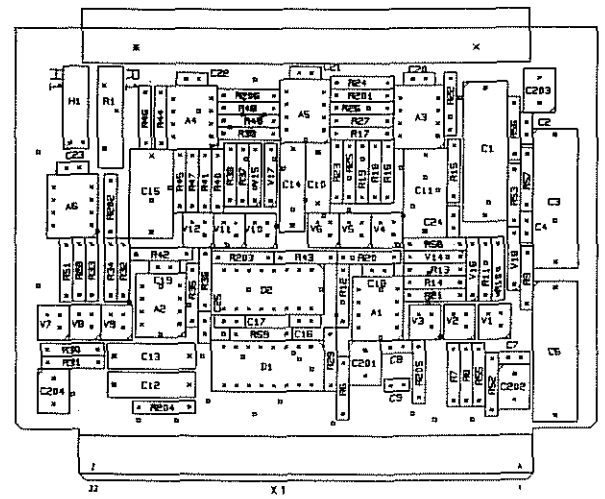
PULSE GENERATOR
4522 107 71013



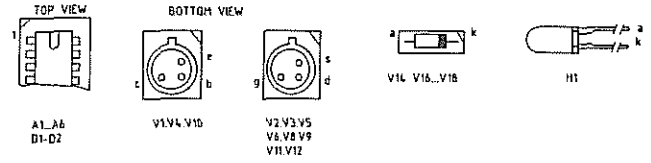
DETAIL 1: CIRCUIT DIAGRAM



DETAIL 2: TROUBLESHOOTING CHART

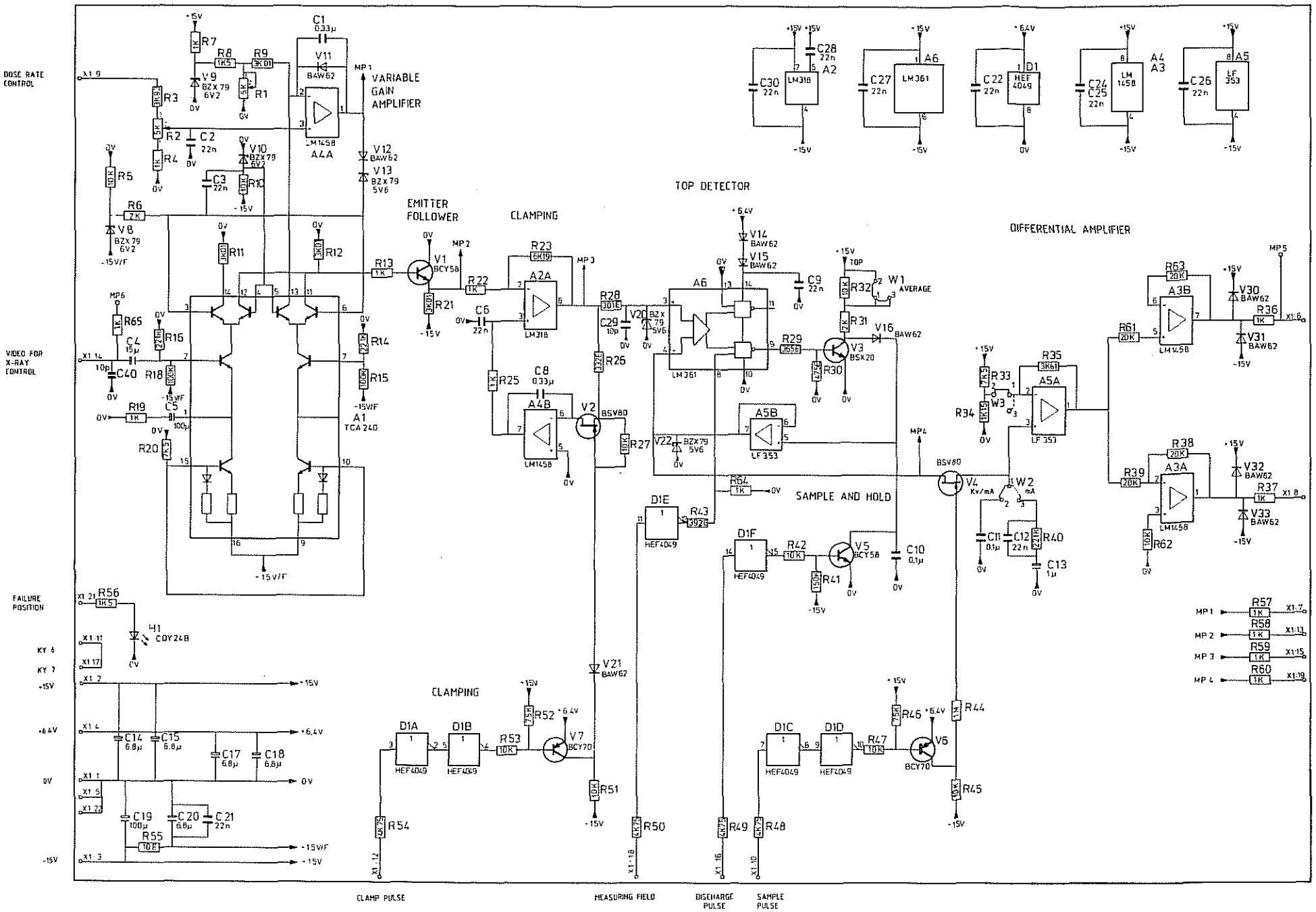


DETAIL 3: PRINTED CIRCUIT BOARD LAYOUT

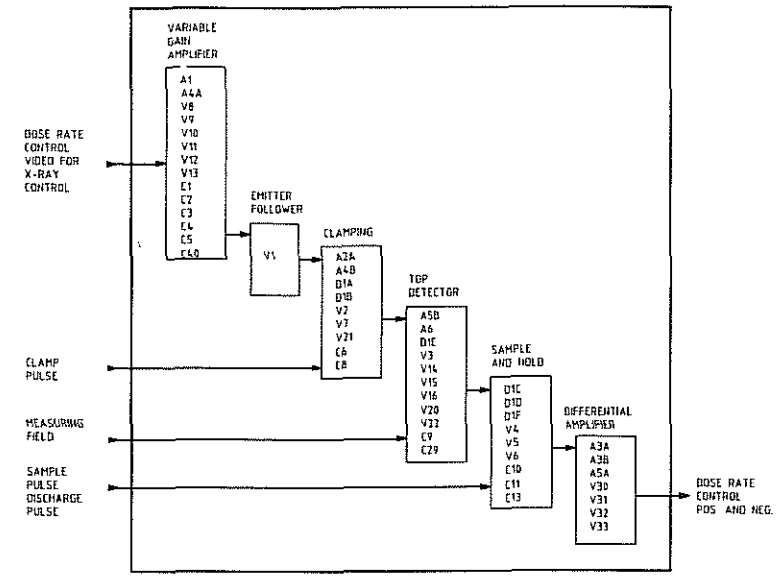


WN21

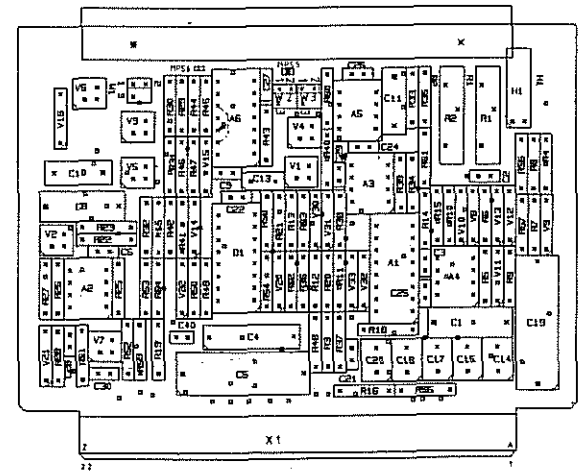
MONITORING
4522 107 7095 4/5/6



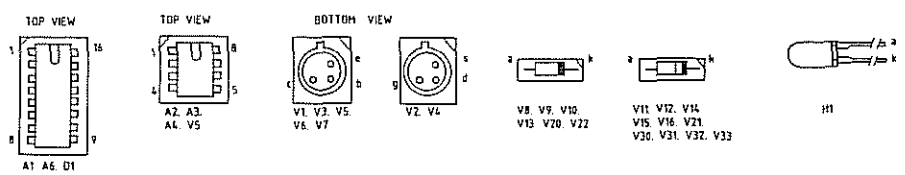
DETAIL 1: CIRCUIT DIAGRAM



DETAIL 2: TROUBLESHOOTING CHART



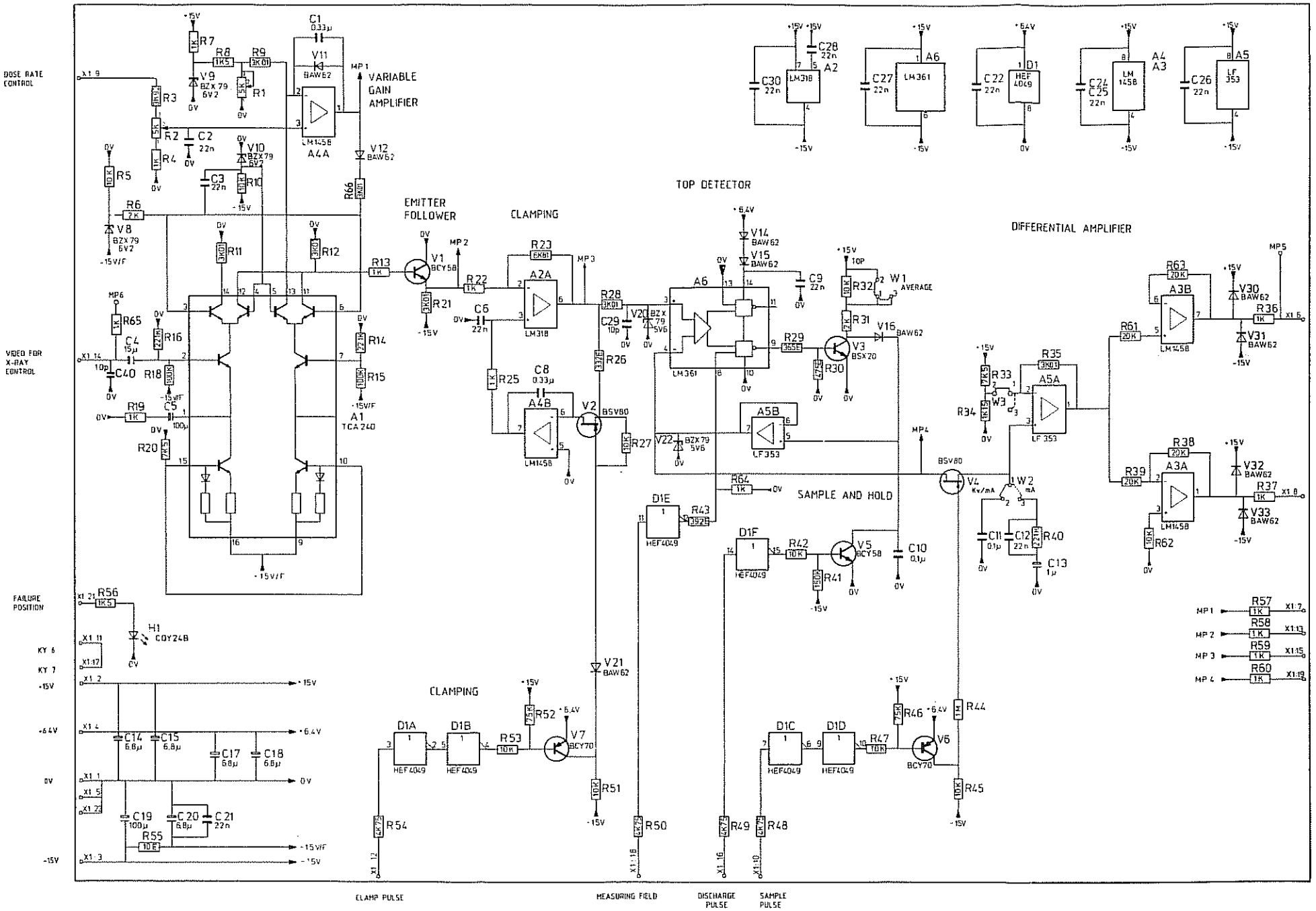
DETAIL 3: PRINTED CIRCUIT BOARD LAYOUT



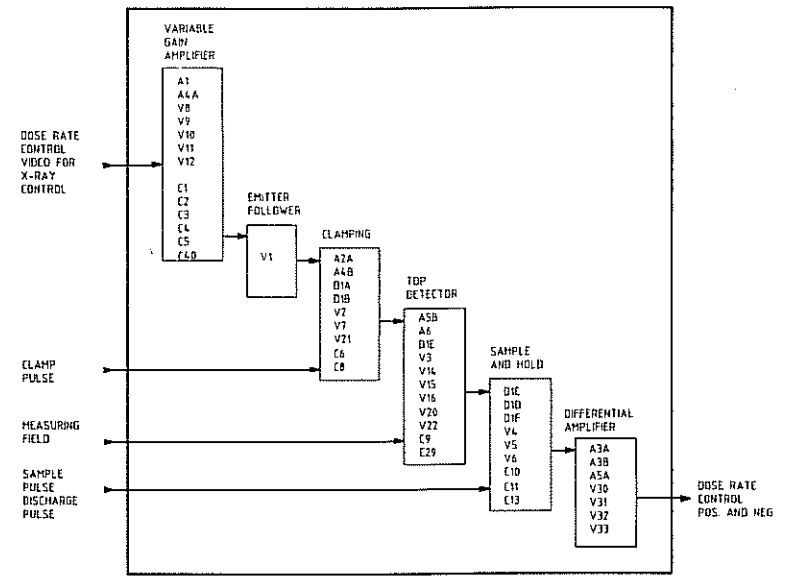
XTV5 TV Control Unit

WN22

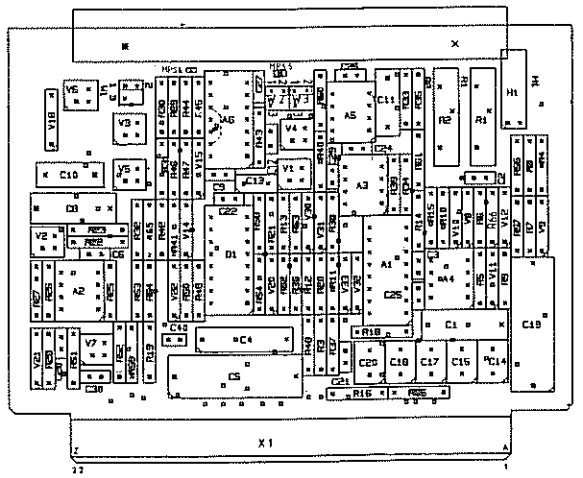
kV CONTROL
4522 107 70855



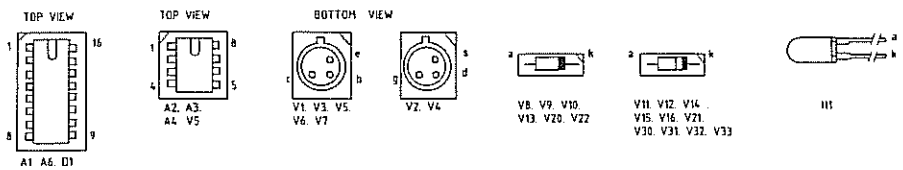
DETAIL 1: CIRCUIT DIAGRAM



DETAIL 2: TROUBLESHOOTING CHART



DETAIL 3: PRINTED CIRCUIT BOARD LAYOUT



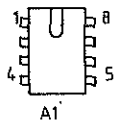
XTV5 TV Control Unit

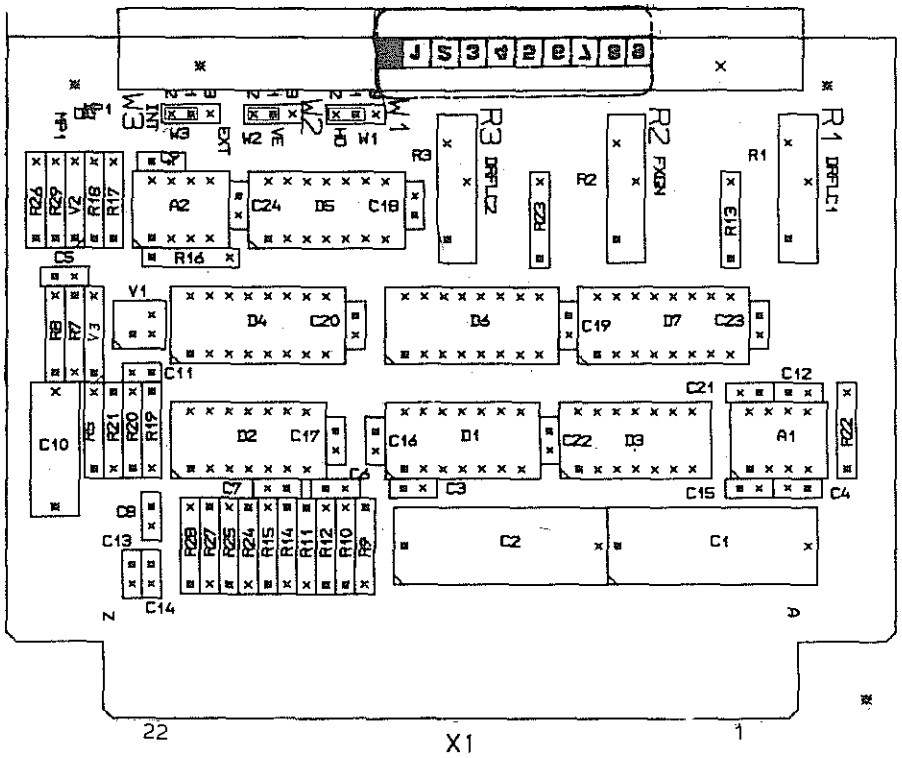
WN22

kV CONTROL
4522 107 70856

VTVS TV Control Unit

TOP VIEW



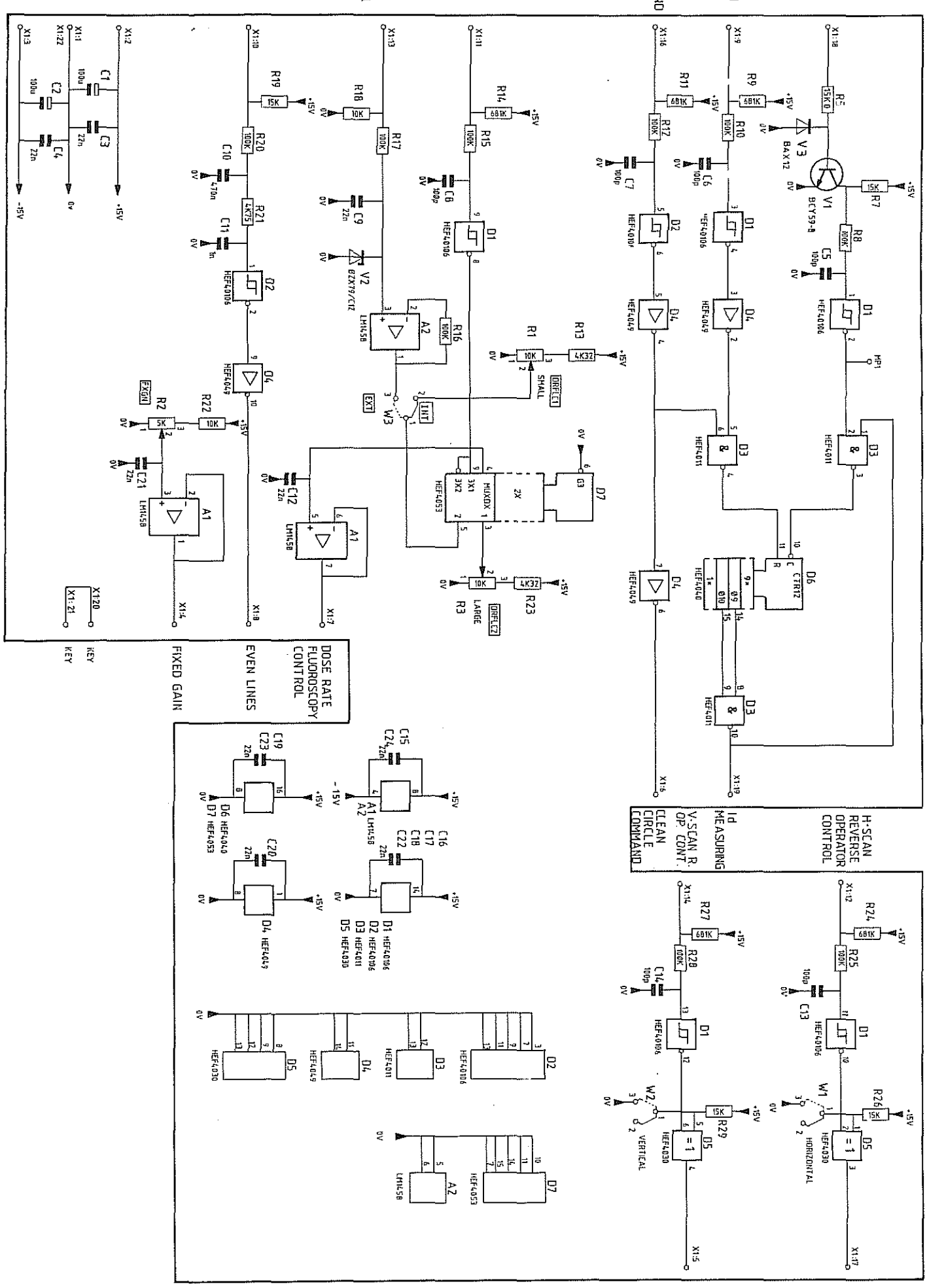


DETAIL 3: PRINTED CIRCUIT BOARD LAYOUT

WN23

ADAPTATION BV25
4522 107 87951

XTV5 TV Control Unit



DETAIL 1: CIRCUIT DIAGRAM